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TROPICAL DISEASES BULLETIN

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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 51] 1954 [No. 7

SUMMARY OF RECENT ABSTRACTS *

VI. PLAGUE †

General

A masterly book on plague and its control has been written by HIRST (p. 1179), who for many years was closely concerned with investigations on the fleas which transmit the disease. He deals with human beliefs about the origin of plague from early times, with its epidemiology, and with control.

Hosts: Transmission

POLLITZER (p. 304) has published a critical summary of existing knowledge of the proved and suspected animal hosts of *Pasteurella pestis*, with special reference to their importance in transmission of plague to man. He discusses the type of transmission which occurs in commensal rodents living in association with man, and in wild rodents, and he gives a list of wild rodents and of species of the order LAGOMORPHA in which plague has definitely been proved. This article forms part of a book now published, and is most authoritative. The same author (p. 405) has produced a similar exhaustive chapter on the insect vectors of plague, in which he discusses every aspect of the natural history of fleas and of commensal and wild rodents. He includes a list of wild-rodent fleas found infected in nature or proved susceptible to experimental infection, and also an annex on identification of some common fleas (by SMIT of the British Museum).

It has been suggested that infected fleas may be found in jute bags imported into America from India, but experiments carried out by NORRIS *et al.* (p. 1135) give no support to this idea, and past experience of importation indicates that the risk of plague infection from fleas without their hosts in such circumstances is probably insignificant. BURROUGHS (p. 932) has investigated the survival of various rodent fleas in the laboratory under different conditions of temperature, humidity, food source and frequency of feeds.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1953, v. 50. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on plague in this series see the July issues of the *Tropical Diseases Bulletin* each year since 1939.

Aetiology

DEVIGNAT (p. 25) discusses the origin of the 3 main varieties of *P. pestis* and thinks that plague in Ituri (Belgian Congo) is caused by the variety *P. pestis antiqua*. Transmission may be from man to man; domestic rat to domestic rat; wild rat to wild rat; domestic rat to man and *vice versa*; domestic rat to wild rat and *vice versa*; wild rat to man and *vice versa*. He gives details of the various rodent reservoirs and vectors. The live EV vaccine appears to be completely effective in prophylaxis, though the Ituri strain, against which protection is sought, is very virulent.

Strains of *P. pestis* isolated from patients, fleas and rodents in Kurdistan were found to have identical features—fermentation of glycerin, no fermentation of rhamnose, no production of nitrous acid, no reduction of nitrates to nitrites. BALTAZARD and ASLANI (p. 26) state that strains with these characteristics have hitherto been described only from Soviet Russia, north of the Caspian Sea.

CHEN (p. 406) describes a haemagglutination test for *P. pestis*; the antigens for which are present in broth cultures, extracts of killed and dried organisms, and in alcohol-precipitated envelope antigens. The crude antigen may be a polysaccharide and does not possess important immunizing properties. The sensitivity of this test is compared with that of bacterial, agglutination and complement-fixation tests.

CAVANAUGH and QUAN (p. 931) have devised a rapid method by which bacteriophage can be used for identification of *P. pestis*.

WALKER *et al.* (p. 623) have studied the multiplication and persistence of virulent and avirulent strains of *P. pestis* in animals. The avirulent strains used as live vaccines may show progressive decrease in the numbers of viable organisms recovered from spleen and liver, or they may even show an increase for a few days, followed by a decrease. Their effectiveness in provoking immunity may be due to richness in the potent water-soluble envelope antigen (Fraction I), or to their ability to multiply rapidly in the tissues and so build up a store of Fraction I.

Treatment

DUBEY (p. 507) treated bubonic plague with streptomycin, the dose usually being a single injection of 1 gm. Few patients needed a second injection. The patients had been ill for 6–72 hours when treatment began; no suppuration occurred. GARBER *et al.* (p. 933) think that a few mutants resistant to streptomycin may be found in cultures of *P. pestis*, but that the numbers are so low that in natural infections they would be unlikely to survive the defensive mechanism of the host on treatment with streptomycin. [But see MCCRUMB *et al.*, below.]

MERCIER and MCCRUMB (p. 406) report the first cases of cure of pneumonic plague with chloramphenicol and (separately) with oxytetracycline. MCCRUMB *et al.* (p. 933) treated 13 patients, suffering from pneumonic plague, with chloramphenicol (6), oxytetracycline (2), streptomycin (3) or a combination (2). The results were dramatically good; only 2 patients died, and in these treatment was started as late as 40 and 24 hours after onset of the disease. The others made a rapid favourable response. Sputum became negative in 4–30 hours. The authors, on the whole, prefer chloramphenicol or oxytetracycline to streptomycin. The effect of aureomycin, oxytetracycline, chloramphenicol and streptomycin in experimental bubonic or pneumonic plague in 25 monkeys was investigated by MCCRUMB *et al.* (p. 934), who infected the animals either intracutaneously or intratracheally. The usual therapeutic result was rapid

defervescence, but there was evidence to suggest streptomycin resistance in 2 of the 6 animals treated with that substance. There were 2 deaths in the chloramphenicol group (one due to relapse), and in 2 animals treated with oxytetracycline, in which the explanation of failure was not apparent.

Control

Wild-rodent plague, with human cases, occurs in Ecuador, and Sáenz Vera (p. 506) shows that a campaign has been organized, in which large numbers of rats were killed with Cyanogas or sodium fluoroacetate, or were trapped. DDT was also used, and the dicoumarol preparation Warfarin, which gave excellent results. Diagne *et al.* (p. 934) write favourably of the action of coumarin derivatives in rat control. A powder form was used in a strength of 1 gm. per 1,000 gm. of millet flour or other bait. There is no action on fleas, and the suggestion is therefore made that DDT should also be used in this kind of work.

Bonnet and Gross (p. 1038) show that there was relatively high resistance to Warfarin in *Rattus hawaiiensis* compared with other rodents. The bait of rolled oats contained 0·025 per cent. of Warfarin.

Plague has long occurred in epidemics in Hyderabad, and in 1949 the systematic use of DDT was started as a measure of control. Khatri (p. 1136) gives an account of its use as a powder introduced into rat holes, and as a spray for houses and the articles in them. The result was a spectacular reduction in numbers of cases and deaths. There was no evidence that DDT was lethal to rats, or that fleas became resistant.

Distribution of DDT dust, to simulate distribution from aircraft, over an area of ground infested with rats (*Neotoma micropus*), was not very effective in controlling the fleas on the rats. Miles and Wilcomb (p. 1136) show that the sticktight flea *Echidnophaga gallinacea* was not affected, and the other fleas very little. *Charles Wilcocks*

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

Thonnard-Neumann, E. Retikulocyteninfektion und Krankheitsablauf bei Malaria tertiana. [**Infection of Reticulocytes and Development of the Disease in** *P. vivax* **Malaria**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1953, June, v. 4, No. 3, 299–312, 3 figs. [24 refs.]

The author studied reticulocyte invasion by *P. vivax* in 18 induced cases (5 transmitted by mosquito). Examination of the blood within 2 hours of a rigor showed that the proportion of reticulocytes invaded was always much higher than that of older cells, the " quotient " varying from 14 to 500. Thus, in 4 of 21 occasions more than half, and in 9, more than a quarter, of the merozoites of a single generation of parasites entered reticulocytes in spite of their relative scarcity. Of 1,000 parasites counted, the smallest number in reticulocytes was 120, the highest 700, the mean 337. Temporary chemotherapeutic control of one brood of parasites in an infection with quotidian periodicity was followed by a fall in parasite numbers and a contemporaneous sharp rise in the percentage of reticulocytes invaded.

A detailed study was made of one case in which the infection was temporarily controlled on the eleventh day by neosalvarsan. This treatment was followed by an immediate fall in numbers of parasites and a contemporaneous rise in the proportion of reticulocytes invaded. The latter preceded the usual rise in reticulocyte numbers. A subsequent temporary rise in parasite numbers was not accompanied by a proportional increase in the percentage of reticulocytes invaded.

The author points out that the third week of infection usually sees the first appearance of evidence of acquired resistance, including specific phagocytosis. He suggests that reticulocytes are less easily phagocytosed than older cells, so that parasites which have invaded them have a better chance of reaching maturity than those which have invaded the latter.

B. G. Maegraith

Garnham, P. C. C., Bray, R. S., Cooper, W., Lainson, R., Awad, F. I. & Williamson, J. **Pre-Erythrocytic Stages of Human Malaria: *Plasmodium ovale*. A Preliminary Note.** *Brit. Med. J.* 1954, Jan. 30, 257.

Among the 4 human malaria parasites, the exo-erythrocytic stages of development have already been described for *Plasmodium vivax* and *P. falciparum*, and those of *P. malariae* probably follow the pattern established for the quartan simian parasite, *P. inui*, by the senior author [this *Bulletin*, 1952, v. 49, 236]. However, there were no clues to the EE development of the rare *P. ovale*.

The strain of the last-named parasite, used in this work, was maintained by passages through members of the present team. In a batch of 750 *Anopheles maculipennis atroparvus* fed on one of them 84 per cent. became infected, and were allowed to feed separately on a second volunteer from whom a small piece of liver was excised 9 days after the first infective feed. Sections of this material showed mature pre-erythrocytic schizonts of *P. ovale*, and some hours after the operation ring forms of the parasite appeared in large numbers in the patient's blood. *C. A. Hoare*

Buonomini, G. & Mariani, M. **World Anophelines belonging to the Subgenus *Maculipennia* Buonomini e Mariani, 1946. A Revision of Anophelines of the so-called "*maculipennis* Complex".** *Riv. di Malariologia.* 1953, Dec., v. 32, Nos. 4/6, 173–88. [20 refs.]

In 1946 [this *Bulletin*, 1948, v. 45, 673] the authors proposed the erection of a subgenus *Maculipennia* to include all the European mosquitoes of the so-called *maculipennis* complex of the genus *Anopheles*.

In this paper arguments are presented in favour of including also the Nearctic members of the complex.

The subgenus *Maculipennia* would thus comprise 3 European and 5 American species as follows:—*Anopheles* (*Maculipennia*) *maculipennis* with its races *messeae* and *melanoon*, the biotype *cambournaci* and the varieties *fallax* and *subalpinus*; *A.* (*M.*) *labranchiae* with its race *atroparvus* and the variety *sicaulti*; *A.* (*M.*) *sacharovi*; *A.* (*M.*) *earlei*; *A.* (*M.*) *quadrimaculatus*; *A.* (*M.*) *atropos*; *A.* (*M.*) *occidentalis* with its varieties *freeborni* and *aztecus*; and lastly *A.* (*M.*) *walkeri*.

Descriptions are given of the biological and morphological characters of the eggs, larvae and adults of these 8 species and of their races and varieties. *H. S. Leeson*

Cefalù, M. Sulle tendenze extradomestiche (esofile) dell' "Anopheles labranchiae" in Sicilia. [**Extradomiciliary Habits of** *Anopheles m. labranchiae* **in Sicily**] *Riv. di Malariologia.* 1953, Dec., v. 32, Nos. 4/6, 213–22, 7 figs. & 1 map. English summary.

After 5 years' widespread use of residual insecticide in Sicily there are still persistant breeding places of *Anopheles m. labranchiae*. The question arose whether the adults responsible for maintaining these foci were resting away from houses and shelters treated with DDT. A few observations of *Anopheles m. labranchiae* in natural resting places suggested that this was possible. The autumn was chosen as the most suitable season to investigate the question. The site chosen (near a small town in the Gulf of Castellammare) was not very important, since similar conditions prevail in most parts of the island. A 3-kilometre semicircle was drawn round a prolific breeding place of *A. m. labranchiae* near the coast. The area was some 15 sq. km. and included the town Balestrate (5½ sq. km.) and a number of scattered buildings and animal shelters, all of which had been treated with DDT in July 1953. A careful search of natural hiding places was made from 10th October to 10th November of that year, during which time the temperature fluctuated between 10° and 20°C.

Some 300 *A. m. labranchiae* and 4 *A. superpictus* were discovered in various shelters, especially crevices in rocks and under boulders in stream beds. Some positive crevices were only large enough to admit the human arm. During this time, only 41 *A. m. labranchiae* were found in houses or shelters.

The author considers that the residual insecticide is acting only against the "domestic" forms of the species, while the "wild" or "non-domestic" strains escape. This would explain why the wide use of residual insecticide has not checked *A. m. labranchiae* in breeding sites, in favour of *A. claviger.*

The residual insecticide is adequate, nevertheless, for *control* of malaria, though it does not approach species eradication.

[Is it not possible that *A. m. labranchiae* shelters in natural cavities as well as human shelters, indifferently, according to chance? The small numbers in houses after DDT treatment are readily explained by the irritant effects of DDT.] *J. R. Busvine*

Vedamanikkam, J. C. **Seasonal Variation in the Breeding Places of** *Anopheles fluviatilis* **James in Wynaad and its Relationship to Eradication of the Species.** *Indian J. Malariology.* 1952, Dec., v. 6, No. 4, 367–79, 1 map & 1 chart.

Observations on the breeding habits of the malaria vector *Anopheles fluviatilis* have been made in the Wynaad, Malabar District, Madras State, India, since 1938.

A summary of the data collected up to 1947 shows that this Anopheline is normally a stream breeder and that from November to May most larvae are found in running water. The number of larvae and adults falls off generally at the beginning of the monsoon season, May to November. During this adverse season both larvae and adults maintain themselves wherever possible and the density of breeding is comparatively higher in stagnant than in flowing water. This period is the weakest link in the life chain of *A. fluviatilis.* Two years of indoor spraying of DDT has resulted in a marked decrease in larvae as well as a dramatic fall in adult captures

and as this mosquito appears particularly susceptible to DDT toxicity it is hoped that household spraying will be continued with a view to the possible eradication of this species from this area. *H. S. Leeson*

Ramakrishnan, S. P. & Satya Prakash. **Host Predilection of *A. fluviatilis* in Terai Region of Uttar Pradesh, India.** *Indian J. Malariology.* 1953, June, v. 7, No. 2, 107–12. [20 refs.]

The Terai or foot-hill region of Uttar Pradesh in north India was known to be highly malarious in the past, although all previous attempts to incriminate *A. fluviatilis* as the vector had been unsuccessful. During 1949–1952 the authors tested 704 samples of blood from these mosquitoes against anti-human serum and found that 47 per cent. of them were positive. An analysis of the results showed that roughly the same percentage were positive against anti-human serum, irrespective of the place of capture of the mosquitoes; the actual percentages of positives were 47 per cent. from human dwellings, 42 per cent. from cattle sheds and 43 per cent. from outdoor resting places. As precipitin tests can be done satisfactorily only on blood from freshly fed mosquitoes, it follows that the mosquitoes caught out of doors must have left the houses immediately after a human blood meal. The greatest number of positive mosquitoes were captured in the hot season during which maximum transmission was possible and the least during the rainy months which are unfavourable for the breeding of *A. fluviatilis*. The sporozoite rate during 1949–52 was 1·6.

In comparing these results with those obtained by Covell in 1938 [see this *Bulletin*, 1940, v. 37, 598], the authors observed a marked increase in both the anthropophilic index and sporozoite rate of these mosquitoes, the 1938 figures being 1·8 and 0 respectively. They consider that a change in the environment of the mosquito is among the probable factors responsible for this increase. In the past the Terai region was densely wooded with little human population. Deforestation leading to reduction in game population, extensive reclamation of land for agriculture and wide colonization since 1949 have resulted in much greater *fluviatilis*-man contact. The authors suggest that the *A. fluviatilis* species complex in an area might be a heterogeneous group, some being anthropophilic and some zoophilic. Owing to environmental changes and relative host availability "it is conceivable that only strains for which the suitable blood meal exists are able to inbreed and multiply while the others become extinct in the area". *M. G. R. Varma*

Rao, B. A., Rama Rao, T. S., Sitaraman, N. L. & Brooke Worth, C. **Anopheline Mosquitoes recorded in the Districts of Shimoga and Hassan, Mysore State.** *Indian J. Malariology.* 1952, Dec., v. 6, No. 4, 475–80. [11 refs.]

"Twenty-three species and one variety of anophelines are recorded from Shimoga District, Mysore State.

"Twenty-four species and one variety of anophelines are recorded from Hassan District, Mysore State.

"*Anopheles annandalei* var. *interruptus* and *A. jeyporiensis* var. *candidiensis* are added to the known fauna of Mysore State.

"Departures from usual habitats and morphology are discussed, and general comments on some of the species are made."

Worth, C. B. **Notes on the Anopheline Fauna of a Hill Tract in Mysore State, India.** *Indian J. Malariology.* 1953, June, v. 7, No. 2, 125–82, 9 figs. [15 refs.]

This paper is the result of a survey of the Anopheline fauna of the hill region of western Mysore in India. The area chosen for study was divided into 3 regions, very different in topography and rainfall and consequently in the flora and fauna; the western hilly region of high rainfall, the Malnad area, is notoriously malarious and consequently is lightly populated; the other regions are the zone of intermediate rainfall which is more cultivated and colonized, and the eastern region with a rainfall of less than 60 inches.

Adult catches of Anophelines were made during the day from houses, "mixed dwellings" (where people and domestic animals are sheltered at night) and cattle sheds. No collections were made from outdoor resting places. Artificial collecting techniques like light traps or window traps were not used. Larvae were collected from tanks, paddy fields and domestic water collections.

The author refers to some of the difficulties and anomalies arising out of surveys in which the conventional methods are used; for example, during the heavy rains gravid females may oviposit in unusual situations which may be overlooked and larvae may be absent in established collecting areas. This may give rise to the confusing state of affairs when adults are present during the heavy rainy season while larvae are apparently absent. It was also found during the course of the survey that the adult population sometimes far exceeded the larval one even though one would expect more larvae than adults; this, the author suggests, may be due to a building up of the adult population. Comparisons of adult and larval densities on the basis of collections per man-hour, the author goes on to say, are mathematically invalid, as 2 different methods of evaluation are used, a visual method for adults and a mechanical one (dipping) for the larvae. The larvae-adult ratio may depend on a number of factors like adult longevity (which in turn is influenced by climate) and larval and pupal mortality. Thus a high larva-adult ratio may be an indication of shortened adult life while the reverse would appear to be the case for adults which live longer. Spraying with DDT, resulting in shortened adult longevity, might raise the larva-adult ratio while a subsequent lowering would suggest a loss of residual potency. An analysis of the catches of adults and larvae of *A. jeyporiensis* and *A. pallidus* lent further support to the view that larva-adult ratios are positively related to the longevity of adult mosquitoes.

A study of the larval and adult population curves for these 2 species in the 3 regions showed that the peaks of larval abundance were not always followed by corresponding peaks of adult abundance; for example, in the case of *A. jeyporiensis* in the high rainfall area there were 2 peaks of adult abundance, one of which was preceded by a larval peak and the other was not. After analysing the results, the author suggests that peaks of adult abundance are based more on conditions favourable for adult survival than increased larvae production. It was also brought out as a result of these studies that *A. pallidus* may be better adapted to withstand dry climate than *A. jeyporiensis*.

In trying to correlate the increase or decrease of the larva-adult ratios of the 22 species collected, with the rainfall gradient, it was found that 3 species showed an increase in the ratio with increasing rainfall; 3 showed a decrease and 10 gave inconsistent results. From these it seems probable that even though rainfall exerts a certain influence, other local conditions may also modify the findings. The influence of such local factors may

result in localized populations making strong adaptations to conditions within the particular environment. It is conceivable that in S. India there may be populations of a given species of Anopheline, living near each other but so much separated by ecological barriers that they might well be on their way to approaching mutual reproductive isolation.

Discussing the significance of rare species, the author suggests that the rarity might be only apparent. Collecting methods may be at fault, or it could be that the rarity was real, as for instance when isolated populations are continually becoming extinct, or where formerly populated areas are being continually re-invaded; such areas may be populated by the mosquitoes in question during some years but not in others.

Notes on the 22 species collected are also given. *M. G. R. Varma*

VAN THIEL, P. H. **Method and Significance of the Determination of Age of Female Anophelines for Basic Entomological Research in DDT House Spraying.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1953, Dec., v. 5, No. 4, 289–302, 14 figs. [24 refs.]

This work was done at Marunda, Java, on *Anopheles subpictus* and *A. sundaicus*. The wing length, size of ovarian ampullae and the stage of development of the eggs of every captured female mosquito were recorded; there were 1,077 *A. subpictus* and 321 *A. sundaicus* but corrected data could be determined only on 906 and 308 mosquitoes respectively.

The right and left ampullae were measured and averaged. The size of an ampulla was determined by multiplying the length by the breadth in ocular units (1 unit = 14·25 μ). The sizes were divided into 19 classes of 10 units each, the smallest (class 1) being 30–40 units and the largest 200–210 units.

As the size of the mosquito influenced the size of the ampullae the dimension was multiplied by a " correcting factor ". A " normal " wing length was regarded as 170 ocular units; the " wing multiplying coefficient " was that with which the wing length was multiplied to reduce it to " normal ". The correcting factor was taken to be the square of the " wing multiplying coefficient " and the ampullae index of a female anopheline was then indicated by the ratio $\frac{\text{corrected dimension}}{\text{uncorrected dimension}}$. For example: in a mosquito with a wing length of 205 units the wing multiplying coefficient would be $\frac{170}{205} = 0{\cdot}83$; and the correcting factor $0{\cdot}83^2 = 0{\cdot}69$. In an ampulla of 80 units (class 6) the corrected dimension would be $80 \times 0{\cdot}69 = 55$ (class 3) which gives an ampulla index of 3/6.

The frequency of egg stages in both species and their corresponding classes of ampullae are shown on graphs both for corrected and uncorrected values. In later work uncorrected measurements only are mentioned. The curves show that successive ovipositions do not occur when the ampullae have one distinct size differentiated from others. For example, in *A. sundaicus* the dimensions vary from class 4 to class 7 at the first oviposition. But whether the data are corrected or not it was decided that it was impossible by these means to determine the exact age of wild-caught mosquitoes. In fact, the only observation that was found to give any true indication of the actual age was the presence of malaria parasites in the salivary glands of a female *A. sundaicus*, thus showing that the mosquito was at least 8–10 days old. There appears to be only one satisfactory way to discover the relationship between the age of mosquitoes and the classes of ampullae and that is to rear different species under controlled conditions and examine them at known ages recording the results.

No differences were found in age, stage of development or in engorgement between those *A. subpictus* which died inside houses and those which left after contact with DDT or which alighted on the unsprayed upper part of the walls or roof without having any contact with DDT. *H. S. Leeson*

Aubry, G. & Portier, A. La pathologie générale du paludisme. Considérations cliniques et pathogéniques. [**The General Pathology of Malaria; Clinical Aspects and Pathogenesis**] *Algérie Méd.* 1952, May, v. 56, No. 5, 277–302. [40 refs.]

This is an important contribution to the literature on the pathogenesis of malaria. The text is divided into sections dealing with the parasite, the reaction of the host and the underlying physiological pathology of the various manifestations of malaria in the host. The literature is extensively reviewed in a clear decisive manner.

The paper does not lend itself easily to review. Those interested are advised to read the original. *B. G. Maegraith*

See also p. 720, Edington, **The Sickle-Cell Trait and Sickle-Cell Anaemia.**

McMahon, A. E., Jr., Kelsey, J. E. & Derauf, D. E. **Hepatitis of Malarial Origin. Clinical and Pathologic Study of Fifty-Four Korean Veterans.** *Arch. Intern. Med.* 1954, Mar., v. 93, No. 3, 379–86, 3 figs. [20 refs.]

Fifty-four Korea veterans infected with *P. vivax* (one with *P. malariae* also) were studied. Liver function tests were performed on 52 and liver biopsy and peritoneoscopy on 34. Biopsies subsequent to treatment were obtained in 25. Liver function tests were performed on admission and weekly thereafter. They included: total and fractional serum protein; cephalin-cholesterol flocculation; thymol turbidity, cholesterol and cholesterol esters, alkaline phosphatase, bromsulphthalein excretion and bilirubin. Therapy consisted of the usual doses of chloroquine in 37 and of pentaquine and quinine in 17. Patients were given a high-protein, medium-fat diet and vitamins.

Results of liver function tests were abnormal in all cases examined. Improvement occurred during therapy.

In 31 cases biopsy showed some change in liver tissue including " increased Kupffer cell activity, swelling of liver cells, compression of sinusoids, clumping and opacification of cytoplasm of hepatic cells, decreased glycogen content, marked variation in size and staining quality of nuclei, and numerous mitoses of liver cells . . . infiltration of sinusoids by chronic inflammatory cells ".

The authors conclude that " hepatitis " was present in all cases. The mechanism of liver damage could not be ascertained. *B. G. Maegraith*

Fidelin, C. Le traitement de l'accès pernicieux palustre par l'association de la médication spécifique et d'un neuroplégique; la chlorpromazine. [**Treatment of Pernicious Attacks of Malaria by Combination of Specific Therapy and a " Neuroplegic " Drug, Chlorpromazine**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 64–8.

The author suggests a therapeutic trial on a large scale of the combination of a specific antimalarial drug plus chlorpromazine (4560 RP: largactil),

the pharmacological action of which on the nervous system is described (sedative, anticonvulsant, antipyretic, anti-emetic and antishock). He reports success in about a dozen cases of pernicious malaria in only 4 of which was the diagnosis of malaria confirmed parasitologically. The 4 case histories are given. In one case, a child of 2 years with high fever and convulsions, the infecting organism was diagnosed as *P. vivax*.

B. G. Maegraith

Ang'Awa, J. O. W. & Fendall, N. R. E. **Clinical Trials of Azacrin in East Africa.** *J. Trop. Med. & Hyg.* 1954, Mar., v. 57, No. 3, 59–65.

The investigations here recorded were carried out in the North Nyanza district of western Kenya, the object being to test the value of Azacrin, a compound of the acridine series [this *Bulletin*, 1953, v. 50, 477] as a therapeutic agent for malaria among the indigenous inhabitants. The subjects treated were 201 patients (150 children, 51 adults) suffering from acute attacks of malaria (198 *P. falciparum*, 3 *P. malariae*) divided into 3 equal groups. Group 1 received Azacrin, Group 2 Nivaquine (chloroquine sulphate) and Group 3 mepacrine hydrochloride, the dosage being as under:

Azacrin—0·1 gramme tablet

Age	Number of tablets per day 1st	2nd	3rd	Total
Under 5 years	1	½	½	2
5–10 years	2	1	1	4
Over 10 years	4	2	2	8

Nivaquine—0·2 gramme tablet = 0·15 gramme chloroquine base

Age	Number of tablets per day 1st	2nd	3rd	4th	Total
Under 5 years	1	½	½	½	2½
5–10 years	2	1	1	1	5
Over 10 years	4	4	2	2	12

Mepacrine hydrochloride—0·1 gramme tablet

Age	Number of tablets per day 1st	2nd	Next 5 days	Total
Under 5 years	1 t.i.d.	1 b.i.d.	½ b.i.d.	10
5–10 years	2 t.i.d.	1 t.i.d.	1 t.i.d.	24
Over 10 years	3 t.i.d.	2 t.i.d.	1 t.i.d.	30

All three drugs proved to be effective schizonticides for *P. falciparum*, parasite clearance times averaging 1·68, 1·75 and 1·76 days in children and 1·2, 1·4 and 1·4 days in adults respectively. As regards clinical response, the impression gained was that Azacrin was slightly more rapid in action than Nivaquine and Nivaquine than mepacrine.

One case of blackwater fever in an Indian child responded rapidly to Azacrin in 3 days. An African infant admitted with convulsions and stupor also responded favourably to the drug. No toxic symptoms directly attributable to Azacrin were observed, but children with gastro-enteritis tolerated Nivaquine and mepacrine better than Azacrin which caused exacerbation of nausea and retching in 11 out of 14 cases, and vomiting in one case.

G. Covell

Jame, P. Traitement de quelques formes de paludisme par la flavoquine. (A propos de 201 observations.) [**Treatment of 201 Cases of Malaria with Flavoquine (Amodiaquine, Camoquin)**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 153–62.

The paper records the immediate results of treatment with camoquin of 201 cases of malaria in a troopship, between Saigon and Marseilles. Cases were not followed up. Upon clinical and parasitological diagnosis camoquin was given orally in a dose of 10 to 15 mgm. per kgm. body weight. Blood examination and clinical assessment were made after 1, 5, 10 and 15 days and the dose of camoquin was repeated on the last day. On the fifth day an injection of adrenaline was given.

Results were very satisfactory so far as disappearance of fever and parasites and retraction of the enlarged spleen were concerned.

One patient with *P. falciparum* infection who was in a state of shock recovered after 1·0 gm. camoquin orally in addition to intravenous fluid replacement. Patients severely infected for some time and with pronounced splenomegaly (so-called *paludéens viscéraux évolutifs*) were given 0·80 to 1·4 gm. camoquin for 2 successive days followed by 0·60 gm. for 10 days.

B. G. Maegraith

Myatt, A. V. & Coatney, G. R. **Present Concepts and Treatment of *Plasmodium vivax* Malaria.** *Arch. Intern. Med.* 1954, Feb., v. 93, No. 2, 191–6, 1 fig. [19 refs.]

In previous publications Coatney and his colleagues have described the life pattern of the St. Elizabeth and Chesson strains of *P. vivax* malaria [this *Bulletin*, 1950, v. 47, 1171; 1951, v. 48, 518]. The former, characterized by long-term latency and late relapse, was isolated in the United States about the year 1923, but it is not known how long it had been indigenous in that country; the latter, characterized by short-term relapse without long latency, was obtained from a soldier repatriated from New Guinea during the second world war. In the present paper the respective life patterns of the 2 strains are summarized and contrasted.

The primary aim of the paper is to present a rationale of treatment of *P. vivax* malaria. The course recommended for an acute attack is chloroquine diphosphate 1·0 gm. (0·6 gm. base) followed in 6 hours by 0·5 gm. (0·3 gm. base); then 0·5 gm. (0·3 gm. base) on each of the 2 following days, making a total of 2·5 gm. (1.5 gm. base) in 3 days.

For the prevention of relapse, primaquine is recommended in a single dose of 15 mgm. daily for 14 days, given either concurrently with the chloroquine course or following this. If a delay of 40 or more days is expected before giving primaquine, suppressive doses of chloroquine diphosphate 0·5 gm. (0·3 gm. base) once weekly are recommended until a course of primaquine can be completed. No toxicity from primaquine is likely in either white or Negro patients at the dosage recommended, but Negro patients should be watched closely for toxic signs. *G. Covell*

Jaswant Singh, Ray, A. P., Basu, P. C., Nair, C. P. & Misra, B. G. **Preliminary Studies on 8-Aminoquinolines.** *Indian J. Malariology.* 1953, Sept., v. 7, No. 3, 289–94. [16 refs.]

Forty-five patients suffering from *P. vivax* malaria were treated in two hospitals in Delhi. Twenty received Quiniplex, each tablet of which contains 150 mgm. (2·25 grains) of quinine and 6·6 mgm. (5·0 mgm. base) of

pentaquine. Twenty received primaquine and 5 quinine and pamaquin. The dosage schedule was as follows: Group I. Primaquine 10 mgm. base daily for 7 days; Group II. Pentaquine 10 mgm. daily for 7 days, plus quinine 19 grains daily for the first 2 days and 9 grains daily for the next 5 days; Group III. Pamaquin 20 mgm. base daily for 7 days, plus quinine 20 grains daily for the first 2 days and 10 grains daily for the next 5 days.

Out of 45 patients treated, 40 were observed for 1 to 2 years, and the remaining 5 for "over 6 months". There were 3 relapses during the observation period, one in the primaquine group and 2 in the pentaquine group. No toxic symptoms were observed in any of the patients treated.

The clinical response was satisfactory in all groups, particularly in the primaquine series, although in this group no quinine was given. The rate of asexual parasite clearance was also more rapid in this group than in the other two.

[The subjects treated were presumably indigenous inhabitants of India, possessing some degree of tolerance to malarial infection. No information is given as to the possibility of reinfection during the observation period.]

G. Covell

Hansen, J. E., Cleve, E. A. & Pruitt, F. W. **Relapse of *vivax* Malaria treated with Primaquine and Report of One Case of Cyanosis (Methemoglobinemia) due to Primaquine.** *Amer. J. Med. Sci.* 1954, Jan., v. 227, No. 1, 9–12.

Nine veterans of the Korean campaign with *P. vivax* identified in blood smears were admitted to the Letterman Army Hospital, California, between July 1952 and January 1953. All had received 300 mgm. chloroquine base weekly while in Korea and 15 mgm. primaquine base prophylactically for 9 to 14 days during their return to U.S.A. by ship (*i.e.*, within 1–3 months of leaving Korea). Two patients had had malarial episodes before receiving primaquine and 5 had febrile episodes "presumably due to malaria" subsequent to receiving primaquine but before admission to the Letterman Hospital. A case report is given of a soldier (of Caucasian origin) who received 15 mgm. primaquine base daily for 14 days on shipboard. On the sixth day he experienced nausea and vomiting which gradually subsided. Three days later there was blurring of vision, bluish discolouration of lips and nail beds. Five days after the last dose of primaquine the methaemoglobin content of his blood was 2·7 gm. per cent. Twelve hours after administration of 300 mgm. methylene blue the methaemoglobin level was 0·58 gm. per cent. and the blueness had vanished.

The authors conclude that the prophylactic administration of primaquine base in daily doses of 15 mgm. for 14 days, as used in these patients, does not always eradicate the tissue phase of the Korean strain of *P. vivax*. Methaemoglobinaemia may occur at this dosage.

A footnote to the paper reports 4 additional relapses of Korean *P. vivax* infections after "standard primaquine shipboard therapy".

B. G. Maegraith

Dern, R. J., Weinstein, I. M., LeRoy, G. V., Talmage, D. W. & Alving, A. S. **The Hemolytic Effect of Primaquine. I. The Localization of the Drug-Induced Hemolytic Defect in Primaquine-Sensitive Individuals.** *J. Lab. & Clin. Med.* 1954, Feb., v. 43, No. 2, 303–9, 5 figs.

The paper opens with a short review of the literature concerning haemolysis caused by the administration of 8-aminoquinolines. Details are

given of experiments in which red cells from primaquine-sensitive subjects were injected into normal recipients and cells from normal subjects into primaquine-sensitive recipients. The injected cells were tagged with radioactive chromium and survival curves were obtained over the 3 to 4 weeks subsequent to injection. After a control period of 4–10 days after injection, primaquine (30 mgm. base daily for 7–14 days) was administered to approximately one half of the group of persons injected with the tagged erythrocytes.

Red cells from primaquine-sensitive subjects were lysed in the normal circulation during the administration of primaquine; cells from normal subjects transfused into primaquine-sensitive recipients were not, even during haemolysis of the recipient's own erythrocytes.

The authors conclude that haemolysis following administration of primaquine is due to susceptibility of the erythrocytes of the sensitive subject and not to abnormal extracorpuscular factors. *B. G. Maegraith*

Carrington, H. C., Crowther, A. F. & Stacey, G. J. **Synthetic Antimalarials. Part XLIX. The Structure and Synthesis of the Dihydrotriazine Metabolite of Proguanil.** *J. Chem. Soc.* 1954, Mar., 1017–31, 2 figs.

Giblin, W. E. **" Daraprim " in the Whagi Valley of New Guinea.** *Med. J. Australia.* 1954, Jan. 2, v. 1, No. 1, 9–10.

Experience of 306 cases of malaria all treated with pyrimethamine forms the basis of this paper. In the series 149 patients were infected with *Plasmodium falciparum*, 100 with *P. vivax*, 42 with *P. malariae*, and 15 with more than one variety of parasite. The patients were treated at the Government Native Hospital, Whagi, and 135 were aged less than 6 years. Parasites were demonstrated in thin blood films in all cases. Children aged 6 years or less were given 25 mgm. drug, repeated after 24 hours. Those aged more than 6 years received 50 mgm. daily for 2 or 3 days. All patients were then given 25 mgm. weekly.

It was found that *P. falciparum* disappeared from thin blood films in 24–48 hours, and *P. vivax* in 4 to 5 days. One fatal case is recorded. The patient was admitted gravely ill with a heavy *P. falciparum* infection and died 8 hours later in spite of having been given 75 mgm. pyrimethamine [presumably by mouth].

[This work suggests that in those partially immune, pyrimethamine may bring malarial infections under control and its regular use prevent overt attacks. The occurrence of a fatal case, however, emphasizes the inadvisability of administering it orally as a schizonticide. In such cases parenteral administration of a more rapidly acting schizonticide might be preferable.] *A. W. Woodruff*

Jones, S. A. **Resistance of *P. falciparum* and *P. malariae* to Pyrimethamine (Daraprim) following Mass Treatment with this Drug. A Preliminary Note.** *East African Med. J.* 1954, Feb., v. 31, No. 2, 47–9.

This work was carried out at Makueni, an African Settlement Area covering approximately 100 square miles in the Machakos District of Kenya. Malaria in this area is described as hyperendemic.

Three mass treatments with pyrimethamine (100 mgm. to adults and proportionately smaller doses to children and infants) were given to the

whole population of the Settlement (3,721 persons including 297 schoolchildren), the first in September 1952 during the season of minimum transmission and before the short rains, the second in March 1953 before the long rains were expected and the third in September 1953 on the anniversary of the first treatment. In addition to the mass treatments all schoolchildren were dosed monthly with pyrimethamine from the fourth month onwards.

Before the first mass treatment the parasite rate (of *P. falciparum*) in a random sample of 60 infants was 48·3 per cent. One month later it was only 3·3 per cent. A random sample of 75 adults taken at the same times yielded figures of 24 and 1·3 per cent. respectively.

Before the first mass treatment 32·6 per cent. of the 297 schoolchildren showed asexual forms of *P. falciparum*. Of these one child had an infection which did not respond to treatment with pyrimethamine. Subinoculation tests with blood taken from this child showed that both sexual and asexual forms of the parasites were strongly resistant to pyrimethamine, with moderate cross-resistance to proguanil.

Before the third mass treatment the parasite rate in a random sample of 100 infants was 32 per cent.; 7 to 10 days later it was 26 per cent. A random sample of 100 adults taken at the same times yielded figures of 12 and 6 per cent. respectively.

Of the original 297 schoolchildren, 221 were still at school at the time of the third mass treatment. Of these, 30·7 per cent. had shown *P. falciparum* infections resistant to pyrimethamine during the 12 months which had elapsed since the beginning of the experiment.

The degree of resistance was high, as was proved by the fact that daily doses of pyrimethamine for 5 or 6 days failed to eradicate asexual forms of *P. falciparum* from the blood, even when the dosage was equivalent to 100 mgm. daily for an adult. By the same means a moderate degree of cross-resistance to proguanil was demonstrated.

As regards *P. malariae*, a schoolchild aged 7 years developed an infection which showed very marked resistance to pyrimethamine. Parasitaemia continued throughout a course of 37·5 mgm. daily for 6 days and also throughout a course of 25 mgm. daily for 6 days given 2 months later. Parasites were still present a month after the second course, but disappeared after a course of 100 mgm. proguanil daily for 6 days.

The author concludes that pyrimethamine should not be given as mass treatment to African populations, at least where malaria is hyperendemic.

G. Covell

Clyde, D. F. **Observations on Monthly Pyrimethamine ("Daraprim") Prophylaxis in an East African Village.** *East African Med. J.* 1954, Feb., v. 31, No. 2, 41–6, 5 graphs.

Pyrimethamine (Daraprim) was administered in a single dose each month to the inhabitants of Mngeza village, which is situated in eastern Tanganyika about 20 miles inland from Tanga, over a period of 6 months. Malaria in this area is described as hyperendemic, transmission occurring throughout the year. The dosage given was:

Children aged 5 years and under—25 mgm.
Children aged 6 to 10 years—50 mgm.
Persons aged 11 years and over—100 mgm.

The predominant malaria parasite in this area is *Plasmodium falciparum*, infections with *P. vivax* and *P. malariae* being rarely encountered.

The parasite rate, which was 64·3 per cent. at the beginning of the experiment, fell to 20 per cent. 4 weeks after the first treatment, but began to rise again after 3 months; 4 weeks after the drug had been discontinued (at the end of the 6 months) it had increased to 58·1 per cent.

The author concludes (a) that under the conditions of the trial pyrimethamine does not appear to be of value as a long-term prophylactic drug when administered monthly in hyperendemic communities in East Africa, and (b) that failure of suppression of *P. falciparum*, with high parasite rates, appears to develop as early as 9 days after full prophylactic dosage.

It is surmised that some development of resistance on the part of the parasite may have taken place. *G. Covell*

Grounds, J. G. **Occurrence of Pyrimethamine Resistant Strain of Malaria in the Teita District of Kenya.** *East African Med. J.* 1954, Feb., v. 31, No. 2, 51–2.

A European child aged 4 years living in the Teita District of Kenya had an acute attack of malaria with numerous ring forms of *P. falciparum* in the peripheral blood. He had been on pyrimethamine prophylaxis (25 mgm. once weekly) for the preceding 8 months. Previously, since arriving in the district 19 months earlier, he had been taking 100 mgm. proguanil regularly once a week. The infection responded satisfactorily to treatment with mepacrine.

Three weeks later *P. falciparum* rings were found in a blood smear taken from the child's mother, who had been having a low grade pyrexia for several days. She had been taking pyrimethamine 25 mgm. once weekly for 8 months. Previously she had taken 100 mgm. proguanil daily. This infection also responded to mepacrine treatment.

On the estate from which these 2 patients came, all Europeans and Asians and most Africans had taken 25 mgm. pyrimethamine weekly for the previous 8 months. Before this all Europeans and Asians took 100 mgm. proguanil daily. The latter drug was also available for the African staff, but there was no supervision or regular dosage, and it is extremely likely that most of the Africans took the drug only irregularly. The author notes that this may have favoured the development of a proguanil-resistant strain of *P. falciparum* malaria, with cross-resistance to pyrimethamine. *G. Covell*

Jaswant Singh, Ray, A. P. & Chandrasekhar, G. R. **Screening of Antimalarials against *P. gallinaceum* in Chicks. Part II.** *Indian J. Malariology.* 1953, June, v. 7, No. 2, 117–19.

The senior author and his colleagues described [this *Bulletin*, 1953, v. 50, 683] their techniques for assay of antimalarial drugs in *P. gallinaceum* infections. Quinine was used as standard and compared with some established antimalarials such as mepacrine (atebrin, quinacrine), proguanil (chlorguanide), amodiaquine, and chloroquine. The activity of pyrimethamine (Daraprim) has now been determined in the same infection. The quinine equivalent of pyrimethamine, determined from the minimum effective dose of each drug was found to be 1,066 and its activity was about 60 times as great as that of proguanil. *J. D. Fulton*

BLACKWATER FEVER

Porte, M. Un cas de fièvre bilieuse hémoglobinurique. Essai de traitement par la cortisone. [**Trial of Cortisone in a Case of Blackwater Fever**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 68–71, 1 chart.

A case of blackwater fever in a man of 25 years was treated with intravenous Subtosan [polyvinylpyrrolidone] (500 cc.) and isotonic glucose (500 cc.) containing vitamin C, solurutine, novocaine and co-carboxylase; 200 mgm. proguanil was given on the second day. Cortisone was administered orally in 25 mgm. doses to a total of 100 mgm. during the first 14 hours after admission, and intramuscularly in 50 mgm. doses during the next 2 days (total dose = 350 mgm.).

No blood transfusion was given, although the red count on admission was 1·69 million cells per cmm.

The patient recovered. The blood picture was restored by anti-anaemic measures including vitamin B12, liver extracts and iron.

[Some workers might consider that rest and transfusion would have been equally successful. It is difficult to see why the author should single out cortisone as the active agent in the therapeutic gallimaufry recorded.]

B. G. Maegraith

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed*:—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Directorate of Colonial Surveys: **Distribution of Tsetse Species in Africa.** [Map compiled and drawn by Directorate of Colonial Surveys from information collated by W. H. Potts, Chief Entomologist, East African Tsetse & Trypanosomiasis Research & Reclamation Organisation (Mean Scale 1 : 5,000,000).] Sheet 3: D.C.S. (Misc.) 48c. 1954. On sale by Edw. Stanford, Ltd., 12/14 Long Acre, London. (Price 4s. 6d. net.)

Sheet 3 of this map completes the set showing the distribution of the species of tsetse flies in Africa [see this *Bulletin*, 1953, v. 50, 1022]. It is of all Africa south of latitude 5°N. and measures 2 ft. 6in. by 3 ft. 4 in. It is on the same mean scale as sheets 1 and 2 and has been compiled in the same style but, owing to the different projection, detail does not compare precisely along the common edge with sheets 1 and 2, but this is not a serious disadvantage.

The southern limits of distribution are shown as:—in the east, *Glossina pallidipes* in Natal; in the centre, *G. morsitans* in Batawana Reserve, Bechuanaland; and in the west, *G. palpalis* about 50 miles inland from Benguella, Angola.

H. S. Leeson

Montézin, G. Remarquable fixité de la souche normale de *T. brucei* de l'Institut Pasteur vis-à-vis de divers médicaments trypanocides (1923–1953). [**Striking Persistence of Virulence and of Sensitivity to Various Trypanocidal Agents Shown by the Pasteur Institute Strain of *T. brucei* during the 30 Years 1923–1953**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 163–70.

Torrealba, J. F. & Díaz Vázquez, A. Una pequeña contribución al estudio de focos extradomésticos de triatomídeos transmisores de la enfermedad de Chagas en Venezuela. [**Study of Extradomestic Foci of Triatomid Vectors of Chagas's Disease in Venezuela**] *Gac. Méd. de Caracas.* 1953, July–Sept., v. 61, Nos. 7, 8 & 9, 259–67. [32 refs.]

Triatoma maculata is quite commonly found in rural dwellings in Venezuela, sometimes along with *Rhodnius prolixus*, the important vector of *Trypanosoma cruzi*. Recently, *T. maculata* has been found frequently as adult and immature stages in fencing, old decaying trees and palms (*Attalea* sp.), some of the bugs being positive for *T. cruzi*. It is probable that bugs from these sites fly to light in human dwellings at night. Eradication of Chagas's disease appears to call for measures adequate to deal with transmission by this partially domestic species of Triatomid. *R. prolixus* was never observed in the extradomestic sites. *D. S. Bertram*

Torrealba, J. F., Díaz Vázquez, A., Vicente Scorza, J., Serpa Sanabria, M., Italia Ramos, B., Riccardi, B. & Segundo Jordán, L. La Iloticina y la enfermedad de Chagas. Otros experimentos con el mismo antibiótico. [**Ilotycin (Erythromycin) in Chagas's Disease and Some Other Conditions**] *Gac. Méd. de Caracas.* 1953, Oct.–Dec., v. 61, Nos. 10, 11 & 12, 309–13.

The English summary appended to the paper is as follows:—

"In this work the authors expose briefly their negative results in the treatment of six patients with chronic Chagas Disease with Ilotycin (Erythromycin, Lilly) administered by mouth during ten days at doses of 300 mgrs. daily, proving by xenodiagnosis, experimental inoculation in white mouse and haemocultures that the trypanosomes were in blood in spite of treatment.

"Also they give an account of their observations on Ascaris lumbricoides and Necator americanus in those patients, recording the abundant expulsion of Ascaris lumbricoides in the 3rd and 4th day of treatment."

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Chen, Tzu-ta, Chen, Pang-mu & Li, Lee-shih. **Post-Kala-Azar Dermal Leishmaniasis.** A Report of Two Typical Cases with special reference to Result of Intensive Antimonial Therapy. *Chinese Med. J.* Peking. 1953, Sept.–Oct., v. 71, No. 5, 334–42, 8 figs. on 2 pls.

Post-kala-azar dermal leishmaniasis is extremely rare in China. Two cases are reported.

The first patient had kala azar and was treated in August 1946; he had an apparent relapse in March 1947 and he first noticed nodules on his face in May 1947. When seen in September he had extensive non-ulcerating nodules all over the face, with an erythema; these gave him a leonine appearance (and had resulted in his being treated for leprosy whenever he sought medical advice). He had nodules also on the buttocks, penis and

scrotum. There was also thickening of the buccal, nasal and pharyngeal mucosae.

Examination of the nodules "by the slit method" showed numerous leishmaniae; leishmaniae were also found in the nasal secretion, in the conjunctival exudate and in the epitrochlear lymph glands, but not in the marrow or spleen-puncture material.

Intense treatment by urea-stibamine, 3·0 grammes in 7 days, resulted in shrinkage of some of the nodules, but, as later others began to increase, a second course (3·7 grammes in 10 days) was given after an interval of about 4 weeks. All the nodules then gradually shrank and disappeared; the erythema disappeared more slowly.

The second patient had had kala azar, received treatment for it, and had been cured 5 years before he observed an erythema and nodules on his face. When he was seen 3 years later, there were a few scattered nodules on the face, neck and chest, and an erythema of the face. A section of a nodule showed leishmaniae. The serum tests for kala azar were all negative and a marrow smear was also negative.

Intensive treatment with Pentostam (24 ml. in 5 days) produced no improvement. The course was repeated a week later, and a third course (36 ml.) was given after an interval of about 2 weeks. The nodules now began to shrink and eventually disappear. He was still free from nodules 3 months later.

The authors consider that the favourable results obtained were due to the choice of intensive antimony treatment. They consider that if intensive courses were used in the treatment of kala azar, these dermal sequelae might be obviated.

[It is of interest that one of the authors of this report and of one of the few other reports on post-kala-azar dermal leishmaniasis in China [this *Bulletin*, 1937, v. 34, 47] each spent several months in Calcutta and saw many cases of this condition; the present authors are therefore probably right when they suggest that many cases remain unrecognized in China.

There is, however, no indication, in this paper or elsewhere, that the concentrated courses of antimony treatment are likely to be more successful than the courses that are extended over longer periods, in either preventing or curing this condition.] *L. E. Napier*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

MATHUR, T. N. **Murine Typhus in Karnal City.** *Indian Med. Gaz.* 1953, Dec., v. 88, No. 12, 623–6.

Four cases of "endemic typhus of the serological type OX19" were seen in Karnal town in October and November, 1951. The *Proteus OX19* reactions reached the following titres in the different cases: (1) 1 in 1,250 on the 11th day; (2) 1 in 1,250 on the 12th day; (3) 1 in 2,500 on the 13th day; and (4) 1 in 50 on the 5th and 23rd days.

There was a pronounced red macular rash all over the body in 2 of the

cases which occurred in the same house at an interval of about 12 days. In the other 2 cases there was no association with these cases or with each other. Only one of the patients was infested with lice. There was a prompt response to chloramphenicol in every case. Karnal was heavily infested with rats at the time and in the 2 months December and January 163 rats were trapped and 190 rat fleas were collected from them. A pooled suspension of 100 of the fleas was inoculated into a male guineapig which gave a febrile and scrotal reaction. No previous reports of the occurrence of cases of murine typhus in the plains of the Punjab are known to have been made.

[There must be many places in the Indian subcontinent where flea-borne, mite-borne and tick-borne typhus would be found if looked for.]

John W. D. Megaw

Mathur, T. N. & Suri, A. R. **Scrub Typhus in the Karnal District of Punjab (India).** *Indian Med. Gaz.* 1953, Dec., v. 88, No. 12, 621–2, 2 charts on pl.

Two cases of scrub typhus are described. The diagnosis was based on clinical grounds and on a positive Weil-Felix reaction of the *Proteus OXK* type at a titre rising to 1 in 5,000 in both cases. The infection occurred in rural areas of the Karnal district of Punjab (India) in September 1951. One of the patients died; the other had a very severe illness. There was no eschar, no rash, no lymphadenitis, and no history of insect bite in either case. On enquiry in the village from which one of the patients came it was found that 6 similar cases had occurred and that in some of these there had been a rash. The blood of 5 of the patients was examined about 2 months after recovery and 2 of them gave reactions of the *OXK* type at a titre of 1 in 250. The land on which the village stands is subject to flooding in the rainy season; it had remained uncultivated for some years after the partition of India when the Moslem inhabitants fled from their homes. Hindu and Sikh refugees from Punjab (Pakistan) were reclaiming the land at the time of the outbreak of scrub typhus, and all the cases occurred among them.

John W. D. Megaw

Sasa, M. & Miura, A. **Studies on the Life History of Tsutsugamushi (Trombiculid Mites) of Japan in the Laboratory.** (Studies on Tsutsugamushi, Part 34.) *Japanese J. Exper. Med.* 1953, Apr., v. 23, No. 2, 171–85, 2 text figs. & 12 figs. on 2 pls. [25 refs.]

Of about 50 species of Trombiculid mites which have so far been collected as larvae from Japan, the authors and their associates have reared 15 species (13 of *Trombicula*, 1 of *Gahrliepia* and 1 of *Doloisia*) up to the nymphal stage. Ten species of *Trombicula* were further reared to the adult stage and in the case of 3, *T. akamushi*, *T. intermedia* and *T. pallida*, second generation larvae were obtained. Glass tubes used for rearing these mites measured 20 mm. × 25 mm. and had a mixture of plaster of paris and 10 per cent. activated charcoal at the bottom. The addition of 1 in 10,000 aqueous solution of merthiolate to the mixture prevented the growth of fungus in the tubes. Nymphs and adults of the mites were fed on the eggs of *Culex pipiens pallens*. The adults after oviposition had to be removed to a new rearing tube to prevent them from eating their own eggs. Development was observed to be much faster at 28°C. than at 23°C. The life-cycle of *T. akamushi* from engorged larvae to second generation larvae

took on an average about 3 months and adults, if carefully maintained, lived for as long as 238 days.

Descriptions of the different stages of *T. akamushi* as well as their behaviour are also included in the text. The emergence of the nymphs and adults from their respective resting stages was observed and recorded with a ciné camera. The nymphs and adults fed by sucking up the contents of mosquito eggs and there are two good photographs showing them in the act of feeding. Nymphs were more active and moved faster than adults. Copulation of adult mites was never observed. Eggs were laid singly and the authors found that sometimes after an egg had been laid on the surface, the mother mite carried it on her back and moved it to a depression in the plaster-charcoal mixture, if she could find one.

The entire development of the mites in the rearing tubes was photographed with a 16 mm. ciné camera. *M. G. R. Varma*

Wisseman, C. L., Jr., Paterson, P. Y., Smadel, J. E., Diercks, F. H. & Ley, H. L., Jr. **Studies on Cortisone and Antibiotics for Prompt Therapeutic Control of Typhoid Fever and Scrub Typhus.** *J. Clin. Investigation.* 1954, Feb., v. 33, No. 2, 264–75, 3 figs. [42 refs.]

Before the introduction of chloramphenicol treatment for typhoid the mortality was about 10 per cent.; about a quarter of these deaths were due to the toxic febrile state. Chloramphenicol treatment does not stop this for 2 or 3 days, and indeed the toxaemia in spite of the treatment may become even more pronounced during this period. It has been shown [this *Bulletin*, 1951, v. 48, 795] that the administration of cortisone, or of corticotrophin, affords prompt relief from the subjective and objective manifestations of the toxic febrile state in typhoid.

Eighteen patients in Malaya, with bacteriologically proven typhoid and ranging in age from 7 to 35 years, were treated with chloramphenicol and concurrently with cortisone orally. The treatment began between the 9th and the 16th days of the disease. For an adult Asian weighing about 45 kgm. 3·0 gm. of chloramphenicol were given initially, followed by 1·5 gm. every 12 hours until 48 hours after defervescence; this course was succeeded after an interval of 7 days by a second course of 1·5 gm. every 12 hours for 8 doses. Concurrently during the first days of the initial chloramphenicol treatment cortisone was given according to one of the following 5 schemes of dosage: to Group i (4 patients) an average total of 10·7 mgm./kgm. for 1 day (for an average Asian adult this was 500 mgm., of which 300 mgm. of cortisone were given with the initial dose of chloramphenicol and 200 mgm. 12 hours later): Groups ii (5 patients), iii (6 patients), and iv (1 patient) cortisone was given twice daily for 2, 3 and 4 days respectively, but the dosage was 8·1–6·4 mgm./kgm. for the first day (300 mgm.), about 200 mgm. on the 2nd day, and 100 mgm. on each of the 3rd and 4th days. It was so arranged that the morning doses on the first 2 days were about twice the evening doses, but subsequently they were equal. Group v (2 patients) was given 50 mgm. doses of cortisone every 6 hours until defervescence, then the same dose every 12 hours to the end of the third day. The data and results are clearly set out in tables.

Whereas normally it takes about 4 days before defervescence under chloramphenicol treatment alone, combined chloramphenicol and cortisone treatment produced dramatic and rapid defervescence in Groups (i) to (iv); the average time was 6 hours. The signs of toxaemia similarly diminished, and an initially semi-stuporose patient might become rational and sit up in

bed within 6 hours of starting treatment. In some cases (10 patients) there was an ensuing hypothermia (temperature below 96°F.), but this was not attended by cardiovascular collapse; the hypothermia lasted only a few hours and it corrected itself without residual after-effects. Hypothermia was seen more commonly in children than in adults (7 of 9 children; 3 of 9 adults); it may occur in those treated solely with chloramphenicol, and it is also sometimes seen in untreated cases of typhoid.

The two Group v patients were given smaller doses of cortisone to avoid provoking hypothermia, and their defervescence was rather more slow and definite than that in the other groups. It was noted that the Group i and ii patients who were given cortisone for only 1 or 2 days had a recurrence of fever and toxaemia within 6 to 24 hours after the last dose; these episodes are called " escapes " from cortisone effect, to distinguish them from true relapses of the disease which may occur some days after the end of antibiotic treatment. In Group iii patients the " escapes " were more irregular both in occurrence and in time of onset; some explanations for this are offered. It is concluded that cortisone treatment should be continued over the time (4 days) necessary for the chloramphenicol to achieve defervescence, or " escapes " may occur. The actual mechanism by which cortisone controls the fever and toxaemia is not understood.

The control of the bacteraemia was as rapid and effective in those treated with chloramphenicol and cortisone as in those given the antibiotic alone; the incidence of true relapses and of complications was similar in the patients treated by either method.

Patients with scrub typhus also were treated with chloramphenicol and cortisone in a similar manner. The distinction between scrub typhus and typhoid is the much more rapid (an average of 21 hours) control of the toxic-febrile state in typhus by the antibiotic when given alone. Though the addition of cortisone in typhus shortened this period to an average of under 7 hours, when the fever ended the headache and certain other symptoms did not do so as rapidly in some patients. Thus, though the use of cortisone in the treatment of typhus concurrently with an effective antibiotic is of theoretical rather than of material interest it is beyond doubt that in selected severe cases of typhoid the use of cortisone greatly benefits the patient. *A. R. D. Adams*

Mooser, H. & Weyer, F. Die Infektion des Rhesusaffen mit Fünftagefieber (*Rickettsia quintana*). [**Inoculation of Rhesus Monkeys with Five-Day Fever** (*Rickettsia quintana*)] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1953, Oct., v. 4, No. 4, 513–39, 20 figs. [19 refs.]

This paper describes very fully the work already noted and abstracted in this *Bulletin*, 1954, v. 51, 49.

RABIES

Peterson, H. Tollwut in Estland 1937–1939 und 1941, 1942. [**Rabies in Estonia in 1937–1939 and in 1941, 1942**] *Ztschr. f. Hyg. u. Infektionskr.* 1954, v. 138, No. 4, 364–7.

Remlinger, P., Bailly, J. & Hadji, A. Un cas de rage récurrente chez un lapin inoculé avec du virus Flury. [**A Case of Recurrent Rabies in a Rabbit Inoculated with Flury Virus**] *Arch. Inst. Pasteur d'Algérie.* 1953, Dec., v. 31, No. 4, 373–4.

Witte, E. J. **Bat Rabies in Pennsylvania.** *Amer. J. Pub. Health.* 1954, Feb., v. 44, No. 2, 186–7.

Witte describes a case of a woman being suddenly bitten by a bat (believed to be *Lasiurus cinereus*—the hoary bat) in Pennsylvania, which was shown to be rabid. [There was no acute illness following the bite such as was described by Venters *et al.* below.] Rabies prophylaxis was started immediately with no adverse symptoms. An immediate bat survey is to be taken. *G. W. A. Dick*

Venters, H. D., Hoffert, W. R., Scatterday, J. E. & Hardy, A. V. **Rabies in Bats in Florida.** *Amer. J. Pub. Health.* 1954, Feb., v. 44, No. 2, 182–5.

Venters *et al.* describe the case of a boy who was bitten in broad daylight by a lactating female Florida yellow bat (*Dasypterus floridanus*) which was found to be infected with rabies. The boy had a severe illness with a sudden onset 28 hours after the bite, with nausea, vomiting and severe shock which subsided after about 6 hours of illness, and the boy was well the next day. Rabies immunization was started and his subsequent history was uneventful. (A somewhat comparable episode is mentioned by Olson (*J. Mammalogy*, 1947, v. 28, 183).

A survey was undertaken to determine the prevalence of rabies in bats in Florida. A total of 384 bats were examined and of these 208 were non-colonial bats collected in central Florida. In this group 5 of 138 yellow bats and 1 of 61 seminole bats (*Lasiurus seminola*) were found positive for rabies. All of the other specimens were negative.

It is not known if these observations represent a local and unique situation or a common but unrecognized one, and present a problem of the spread of rabies in the insect-feeding non-colonial bats. It seems that direct exposure of human beings to rabies by bats in Florida or the United States is a minor but nevertheless existing hazard. *G. W. A. Dick*

Ando, K., Ishii, K., Oka, Y., Irisawa, J., Shimada, K. & Kato, T. **Studies on the Immunological Diagnosis of the Animals suspected of Rabies.** *Japanese J. Med. Sci. & Biol.* 1953, Apr., v. 6, No. 2, 221–45. [13 refs.]

The detection of rabies in the dog by demonstration of Negri bodies in sections or smears of brain is sometimes difficult and not always reliable. The inoculation of mice is in several respects a more satisfactory method of detecting rabies virus, but it takes at least 7, and sometimes 14, days: it is most valuable as a confirmatory test.

Following up older work, the authors have devised a complement-fixation test, in which antigens prepared from the brains or salivary glands of rabid dogs are tested against the sera of guineapigs immunized with a fixed virus vaccine of a strain MDH inactivated by ultra-violet light. Only guineapigs free from antibody to Japanese B virus were used.

Antigen was prepared from brain, stored in a " deep freezer ", by making a 40 per cent. emulsion in saline at *p*H 7·2, by grinding with sand, or in a Waring blendor. The emulsion was held at 40°C. for one hour, and then centrifuged at 10,000 r.p.m. for 15 minutes. The supernatant fluid was used as antigen. Salivary gland antigen was prepared in much the same way, except that a 33 per cent. suspension was prepared for the blendor by

cutting the gland into pieces about 1 mm³. and adding twice the amount of saline.

The complement-fixation method, described in detail, employed 2 units of complement.

Tests on normal dog brains [23 are tabled] gave no false positives.

On 103 cases [3 cats, 100 dogs] the complement-fixation test was compared with detection of Negri bodies in impression preparations (stamp samples) and sections; 26 were positive by both tests; 2 were positive for Negri bodies and weakly positive to complement fixation; 5 were positive to complement fixation but negative for Negri bodies. None of 69 cases negative to complement fixation showed Negri bodies.

[This is a good and careful paper which should be consulted for full technical details. The complement-fixation test described is claimed as a better test than the search for Negri bodies. It is desirable that laboratories which can command the necessary facilities should examine this claim.]

E. T. C. Spooner

Dogra, J. R. **Studies on Antirabic Vaccine. X. Preservation of Rabies Virus by Freeze Drying.** *Indian J. Med. Sci.* 1953, Dec., v. 7, No. 12, 686–93. [14 refs.]

Yaoi, H., Takei, M., Maeda, H. & Yaoi, H., Jr. **Studies on the Rabies Vaccine. XIIth Report: Further Studies on the Method of Preparation and Storage of the Inactivated Anti-Rabies Vaccine.** *Yokohama Med. Bull.* 1953, Aug., v. 4, No. 4, 185–98. [13 refs.]

In this paper the authors report the results of further studies they made on the method of preparing and storing Merzonin-inactivated antirabies vaccine.

To determine the concentration of Merzonin (M) suitable for the preparation of potent vaccine, emulsions of guineapig brain infected with the Nishigahara strain of rabies virus were treated: 20 per cent. emulsions with 0·1 per cent. M, 10 per cent. with 0·01, 0·02, 0·05 and 0·1 per cent. M, and 5 per cent. with 0·01 per cent. M. All emulsions so treated were then placed in the incubator at 37°C. for 5 days to ensure complete inactivation of the virus. For purposes of comparison, a 10 per cent. emulsion to which no M had been added was exposed to the effect of temperature alone. Among these several emulsions, no marked difference was found in the antigenic potency of virus inactivated by the combined use of M and heat, but the potency of virus inactivated by heat alone proved to be relatively low. Because of the fact that at lower temperatures inactivation by M had been found to proceed too slowly for practical purposes, experiments were made to discover the most suitable temperature for inactivation commensurate with the retention by the virus of high antigenic potency. To this end inactivation was accelerated by exposing 10 per cent. infected guineapig brain emulsions, to which M had been added in a concentration of 0·1 per cent., to temperatures of 45°C. for 24–48 hours, 37°C. for 5 days, 30°C. for 7 days, and 20–23°C. (room temperature) for 27 days. Appropriate tests made thereafter showed the antigenic potency of virus inactivated at 37°C. to be uniformly satisfactory, although that of virus inactivated at room temperature over a long period proved to be considerably higher.

The results of experiments carried out to ascertain the effect of purification on the antigenicity of M-inactivated vaccine are next recorded. Vaccine prepared from the supernate of the 10 per cent. infected guineapig brain emulsion used proved to be much less antigenic than one prepared by

resuspending the sediment in the original volume of normal saline solution. When, however, to the supernate was added sediment, derived from 10 per cent. normal guineapig brain emulsion which had been subjected to the combined action of 0·1 per cent. M and a temperature of 37°C. for 5 days, in an amount equivalent to that of the sediment derived from the infected brain emulsion after screening and centrifuging, the antigenic potency of the supernate was then found to have to some extent increased. That brain tissue has a certain adjuvant action in antirabies vaccine would seem, therefore, to be undeniable. For purification of M vaccine, precipitation was also effected by the iso-electric point method (*p*H 4·6), with a result somewhat better than that obtained from simple centrifuging. Although their previous experience had shown that purification of ordinary liquid M vaccine by removal of its lipids resulted in a considerable loss of antigenic potency and was, therefore, contraindicated as a preparatory process in the production of such vaccine, the authors have now found that lyophilized M vaccine can be extracted with benzene without loss of antigenicity—a finding comparable with that recorded by Habel, Bell and Wright [this *Bulletin*, 1949, v. 46, 733], with respect to the extraction of lyophilized ultraviolet-irradiated vaccine with benzene-ether. During the lyophilizing process itself, however, a certain loss of potency had been observed—a loss due to the extremely low temperature to which during the first stage of the process the vaccine virus has to be subjected. Thus, whereas M vaccine at the time of its production had an MLD protection value of 372,000, it had, after lyophilization, one of 95,500.

Finally, the authors record the results of a number of experiments made to ascertain the effect of storage on the antigenic potency of M vaccine. That vaccine (10 per cent. brain emulsion + 0·1 per cent. Merzonin) kept its original potency for at least a year, when stored in the ordinary refrigerator (4°C.). By way of contrast, the potency of standard phenolized antirabies vaccine for veterinary use (20 per cent. brain emulsion + 0·4 per cent. phenol) was reduced to one-third after 4 months and to one-fifth after 12 months. It is also stated that under similar conditions of storage lyophilized vaccine could retain its potency for 6 months, but that when kept at the same temperature, after the vacuum had been broken, a marked drop in potency resulted. [This was, of course, to be expected.]

G. Stuart

Coonoor. The Pasteur Institute of Southern India, Coonoor. Scientific Report 1953. **The Value of 5% Semple's Antirabic Vaccine in Human Treatment—A Comparative Study of the Mortality among the Treated and Untreated** [Veeraraghavan, N.]. pp. 2–10. 1953. Madras: Diocesan Press.

This paper records the results of an enquiry, instituted in 1946 and covering the period 1946–52, to determine whether the 5 per cent. Semple's vaccine has any protective value under circumstances in which adequate control groups of untreated persons-at-risk have been observed, and whether there is any variation in the mortality rate as a result of treatment with 5 per cent. Semple's vaccine instead of the 1 per cent. vaccine used during the period 1912–24, for which similar data had been collected. For statistical purposes the 2,649 persons bitten by infective, proved, or presumably rabid animals during the 1946–52 period have been classified into 3 groups: Group I: 237 bitten by animals, the infectivity of which had been proved by the death from rabies of one of the persons or animals bitten by

them. Group II: 396 bitten by animals proved rabid by laboratory examination or certified rabid. Group III: 2,016 bitten by presumably rabid animals, which had been killed after biting 2 or more persons. Of the 994 biting animals involved in the investigation, dogs numbered 718, jackals 227, foxes 15, and other animals 34, representing percentages of 72·2, 22·8, 1·5 and 3·5, respectively, of the total.

Among the 2,649 bitten persons observed, 2,349 had received the full course of treatment, 61 had been incompletely treated, and 228 had remained without treatment. There were 12 deaths (0·51 per cent.) among the completely treated, 4 (6·6 per cent.) among the incompletely treated, 25 (11·8 per cent.) among the untreated, and 36 (15·1 per cent.) among the 239 who had remained untreated or had died during treatment.

If, however, consideration is confined to the 237 persons in Group I, it emerges that death from rabies occurred in 12 (7·96 per cent.) of the 151 who had received complete treatment, in 4 (26·7 per cent.) of the 15 who had been incompletely treated, in 25 (41·7 per cent.) of those who had remained without treatment, and in 36 (50·7 per cent.) of the group of 71 who had been untreated or had died during treatment. From these particular figures the author concludes that treatment with the 5 per cent. vaccine would appear to save 4 out of every 5 persons who would otherwise have developed rabies and died.

Reverting to the previous figures relating to the 2,649 persons bitten by infective, proved, or presumably rabid animals, and to the 0·51 per cent. mortality in the completely treated group, the author points out that this rate is only about one-sixth of the 2·9 per cent. mortality rate reported among the completely treated for the 1912–24 period, during which 1 per cent. vaccine was used. The results of treatment with 5 per cent. vaccine are, therefore, superior to those obtained with 1 per cent. vaccine.

G. Stuart

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Néel, R. & Baltazard, M. Mise au point d'une réaction d'hémagglutination protéinique pour la peste. [**The Adaptation of a Protein Haemagglutination Reaction for Plague Diagnosis**] *Ann. Inst. Pasteur.* 1954, Jan., v. 86, No. 1, 18–28, 3 figs. [15 refs.]

This is a detailed description of a method of applying the Boyden haemagglutination test for the detection of plague antibodies in the sera of experimentally infected rabbits. An essential feature of the Boyden method is the preliminary "tanning" of the sheep red blood cells by treating them with a solution of 1 in 15,000 highly purified tannic acid in normal saline. This procedure inhibits the spontaneous haemolysis and agglutination of the cells and it is claimed that the method is much more sensitive than any of the other serological tests for plague, including the ordinary agglutination test.

A highly purified antigen (fraction IA) containing a minimum of polysaccharides is used for sensitizing the red cells. The text is illustrated by

photographs of the appearances observed in positive and negative reactions. The test obviously calls for meticulous attention to details of the technique.
John W. D. Megaw

Silverman, M. S., Chin, P. H., Greenman, V. & Young, J. C. **The Cause of Increased Susceptibility of Mice to Avirulent *Pasteurella pestis* after Exposure to a Sublethal Dose of X Irradiation.** *J. Infect. Dis.* 1954, Jan.–Feb., v. 94, No. 1, 47–52. [17 refs.]

Several workers have reported that mice become more susceptible to the effects of injections of living and killed cultures of *Pasteurella pestis* after the animals have been exposed to sublethal irradiation with X-rays. The authors give details of experiments whose purpose was to find whether this increased susceptibility is due to the multiplication of the organisms in the tissues of the mice or to the toxic effect of the endotoxins contained in the inoculum.

In experiments on groups of mice the following results were observed: Formalin-killed *P. pestis*, in which the endotoxin is presumably neutralized, did not cause the death of either irradiated or non-irradiated mice, whereas heat-killed organisms in which the endotoxic activity is maintained were lethal to both groups of mice. Mice immunized with the plague endotoxic Fraction II and then irradiated were completely protected against later inoculation with living avirulent *P. pestis*. Mice immunized with the antibacterial Fraction IA were not protected against large doses of these organisms though the irradiated animals were more susceptible to the toxin than the control animals.

No increase in virulence was detected in strains of *P. pestis* isolated at necropsy from the spleens of infected mice, sometimes as late as 12 days after infection, irrespective of irradiation or non-irradiation.

It was concluded that the increased mortality among irradiated mice inoculated with avirulent *P. pestis* is due to increased susceptibility of the animals to plague endotoxin and that this results from " the general stress of radiation injury ". *John W. D. Megaw*

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Brandis, H. & Brück, E. Serologische Untersuchungen über Vibrionen-Hämolysine. [**Study of the Haemolysins of Vibrios**] *Ztschr. f. Hyg. u. Infektionskr.* 1954, v. 138, No. 6, 554–60, 5 figs. [15 refs.]

Serological examination of haemolysins produced by German and Indian strains of water vibrios suggests that the haemolysins produced by different strains are more or less related, but not identical.

[The serological methods used are not such as would justify much confidence in the conclusions; the possibility of the filtrates containing mixtures of antigenic haemolysins does not seem to have been considered, though it would be a reasonable conclusion from the data.] *C. L. Oakley*

Gurkripal Singh & Ahuja, M. L. **Observations on the Intestinal Epithelium Desquamating Enzyme of Vibrios isolated from Cholera and Non-Cholera Sources.** *Indian J. Med. Res.* 1953, July, v. 41, No. 3, 285–94.

The observation that mucinase present in filtrates of cultures of *V. cholerae* produces desquamation of the intestinal mucosa of guineapigs [*Bulletin of Hygiene*, 1948, v. 23, 290] had led to the suggestion that the enzyme may play a part in the pathogenesis of cholera. This point was studied by investigating mucinase production by vibrios of different types and origin, and by determining whether immunization with vaccines prepared from cholera and non-cholera strains influenced this action. The strains investigated for their desquamating action included smooth and rough *V. cholerae*, El Tor strains, vibrios both agglutinable and non-agglutinable isolated from water in India, and inagglutinable strains isolated from stools of cholera cases. Filtrates of the cultures in a series of dilutions were applied to freshly dissected strips of guineapig ileum, a positive result being indicated by the appearance of a characteristic fine granular suspension after 3 hours at 37°C.

All 17 smooth cholera strains tested were found to produce mucinase at varying levels; activity was not related to the age of the strain. Out of 18 rough cholera strains 14 showed low-grade activity only, the remaining 4 being negative. Five out of 6 El Tor (Celebes) strains and 1 out of 5 classical El Tor strains showed low-grade activity. Of 14 non-cholera vibrios, belonging to different Heiberg groups, which had been isolated from water, all but 2 gave positive results, in some cases at high level. Seven out of 10 non-cholera vibrios isolated from stools of cholera cases were also positive. It is thus shown that mucinase activity is not confined to *V. cholerae* but is shared by other members of the vibrio group.

The possible protection against the desquamating action of mucinase which might be afforded by immunization was tested in guineapigs inoculated with vaccines prepared with both cholera and non-cholera strains, strips of their intestine being subsequently exposed to the action of filtrates of strains of homologous or heterologous types. Under the conditions of the last test employed no protection was demonstrated. The observations made leave it in doubt whether the enzyme plays a rôle in the causation of the cholera syndrome. *J. Taylor*

Narayanan, E. K., Devi, P. & Menon, P. S. **Enzymes of *V. cholerae* with Possible Rôle in Pathogenesis.** *Indian J. Med. Res.* 1953, July, v. 41, No. 3, 295–9.

Quantitative estimates were made of the enzymes present in filtrates of cultures of *V. cholerae*, water vibrios, El Tor strains and certain other organisms mostly of intestinal origin. Those studied were collagenase, elastinase, mucinase and lipase.

Collagenase tests carried out on collagen prepared from buffalo tendo Achilles showed the enzyme to be produced by all vibrio strains examined, including 7 *V. cholerae*, 7 water strains, 6 El Tor and *V. metchnikovi*. It was not present in filtrates of cultures of *Bact. coli*, *Salm. typhi-murium*, *Salm. derby* or *Sh. flexneri* but was actively produced by *Ps. pyocyanea*.

Elastinase tests on elastin prepared from buffalo ligamentum nuchae were positive with filtrates of 2 out of 7 strains of *V. cholerae*, 3 out of 7 of water vibrios and 1 out of 6 El Tor, and at lower level in the case of *V. metchnikovi*. The four strains of intestinal organisms gave negative results but *Ps.*

pyocyanea was positive. Mucinase tests on ovomucin (prepared by the method of Gottschalk and Lind) were positive with all vibrios of the different types examined except *V. metchnikovi* and negative with the other organisms. Filtrates freed from the receptor-destroying enzyme were found to retain their mucinase activity.

Lipase. With olive oil as the substrate, single strains of each of the 3 vibrio classes (*V. cholerae*, water vibrio and El Tor) which were examined all gave positive results.

It is thus shown that mucinase, collagenase and lipase were produced by all strains examined including non-cholera and cholera vibrios, and elastinase by a proportion in each class. On this finding it is not possible to say whether the enzymes may play a part in the pathogenesis of cholera.

J. Taylor

Seal, S. C., Ghosh, M. M. & Ghosal, S. C. **Further Trial of Aureomycin in the Treatment of Cholera.** *Brit. Med. J.* 1954, Mar. 27, 740–42.

The value of oral administration of aureomycin in treatment of cholera was assessed in a series of 50 patients, a comparison being made with others treated with sulphaguanidine and with those not receiving either drug. The usual saline transfusion treatment was given in all cases. The dosage employed was 250 mgm. every 3 hours and the average total dosages given for severe, moderately severe, and mild cases were respectively 6·5 gm., 5·5 gm. and 4·8 gm. The clinical states and progress of the 3 groups were closely comparable. Mortality rates with aureomycin, sulphaguanidine and in the control group were respectively 14·0, 14·3 and 14·3 per cent., and the average duration of the acute phase 37·1, 39·7 and 47·3 hours. The duration of suppression of urine in the 3 groups was 16, 16·3 and 22·75 hours. Excluding the patients who died the average duration of stay in hospital was 5·5, 6·5 and 5·9 days. Complications were slightly more frequent in patients receiving aureomycin or sulphaguanidine.

Aureomycin thus did not appear to influence the course of the attack. It was, however, noted that the period over which the vibrio could be isolated from the stools was somewhat shorter in those treated with aureomycin, the average being 2·75 days as compared with 3·2 days for the sulphaguanidine group and 3·72 for those receiving neither drug. [For a previous trial by the authors with intravenous aureomycin, see this *Bulletin*, 1952, v. 49, 395.]

J. Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Simitch, T. & Pétrovitch, Z. Longévité de la forme végétative de *E. dysenteriae* dans divers milieux. [**Viability of Vegetative Form of *Entamoeba histolytica* in Various Media**] *Arch. Inst. Pasteur d'Algérie.* 1953, Dec., v. 31, No. 4, 375–80.

In this work the authors set out to determine (a) the length of time during which trophozoites of *Entamoeba histolytica* can be detected in human

stools and urine, and (b) the rôle of these forms in the epidemiology of amoebiasis. Observations were accordingly carried out on amoebae left for various periods of time in faeces, in urine, in water and in hypotonic solutions, after which their viability was tested by cultivation at 37°C. in a medium consisting of Loeffler's serum slope covered with saline, to which rice starch was added.

The experiments and their results were as follows. In one set of experiments, the stools of 20 human carriers of *E. histolytica*, recovered after administration of a purgative, were diluted with saline and kept at room temperature and at 5–6°C. (in a refrigerator). Cultures of the samples left at room temperature and the faecal samples kept in the refrigerator showed that all the amoebae survived for 10 hours, and that in some cases they were viable after 24 hours. It is concluded that trophozoites of *E. histolytica* can be detected at least 10 hours after the discharge of stools, provided these are diluted with saline, but in view of the scantiness of the parasites in some cases, faecal cultures afford a more reliable method for the diagnosis of amoebic infection.

In other experiments, samples of amoebic culture (2 drops) mixed with human urine (4 cc.) were kept at room temperature. Cultures made after various periods showed that the trophozoites survived after having been exposed to urine for 10–15 hours. Hence it is concluded that the presence of urine in stools is not detrimental to the amoebae and does not adversely affect the parasitological diagnosis of the disease. [This is contrary to the generally accepted view: see especially this *Bulletin*, 1945, v. 42, 947.]

In a 3rd set of experiments, fluid containing amoebae (2 drops) was mixed with distilled water (4 cc.) and kept up to 3 hours. Cultures made at different intervals showed survival of trophozoites for 1–2 hours, and only exceptionally up to 15 hours. From these experiments the authors conclude that water does not play an important part as a source of human amoebiasis. [A remarkable conclusion, considering the well-known fact that trophozoites of *E. histolytica* are not infective under any conditions.]

Finally, in the last series of experiments, fluid containing amoebae was added to various dilutions of saline in distilled water. The survival of the amoebae (tested by culture) proved to be proportional to the degree of dilution, *viz.*, from 24 to 30 hours when the proportion of water to saline was 1 to 3 and from 10 to 15 hours when it was 3 to 1. *C. A. Hoare*

Goldman, M. **Cytochemical Differentiation of** *Endamoeba histolytica* **and** *Endamoeba coli* **by means of Fluorescent Antibody.** *Amer. J. Hyg.* 1953, Nov., v. 58, No. 3, 319–28, 1 text fig. & 7 figs. on pl.

The author describes a cytochemical test for the differentiation of *Entamoeba histolytica* and *E. coli*, by means of the fluorescent antibody technique of Coons, Creech, Jones and Berliner (1942), the principle of which is as follows: after preparation in the usual way, specific antiserum is treated with a fluorescein derivative, giving rise to a protein-fluorescein conjugate, which will combine with homologous antigen into a product that is detectable microscopically owing to its fluorescence. *E. histolytica* antiserum was prepared by repeated subcutaneous inoculation of rabbits over a period of 2 weeks with centrifuged and washed amoebae and cysts derived from cultures, each rabbit receiving about 10 million organisms. Blood taken from treated rabbits was allowed to clot, and the serum was merthiolated and stored. Washed and lyophilized amoebae from cultures were extracted in saline, 1 ml. of extract containing soluble antigen derived

from about 5 million organisms. Both antiserum and normal rabbit serum were conjugated with fluorescein isocyanate, and the resulting products were purified. It was found that both conjugates stained amoebae and rice-starch non-specifically but this staining can be eliminated by shaking the conjugates with liver powder. When thus absorbed, the amoebae are stained specifically by antiserum-conjugate.

For the test, washed culture amoebae were killed with methyl alcohol (3 minutes), and suspended in saline; then the amoebic suspension was centrifuged, and the supernatant fluid was removed. To the sediments of different tubes were added 0·1 ml. amounts of conjugate, after which they were allowed to react for a few hours at room temperature or overnight in the ice-box. At different intervals samples of the sediment were mixed on a slide with a drop of phosphate buffer at *p*H 7·5 and examined with a fluorescence microscope.

It was shown that dead trophozoites and cysts of *E. histolytica*, exposed to homologous antiserum-conjugate, became fluorescent. Since normal serum-conjugate also stained the amoebae slightly, the tests were carried out with dilute antiserum-conjugate, which produced maximum fluorescence in the amoebae in 2–3 hours, whereas in normal serum-conjugate they remained invisible in ultra-violet light. In a series of control experiments it was demonstrated that the homologous reaction was immunologically specific. Having established this fact, the author tested the reaction of *E. coli* to anti-*histolytica* conjugate, and found that it also became stained but to a lesser degree than the homologous species. However, by repeatedly absorbing the conjugate with intact *E. coli*, a stage was reached when amoebae of this species remained unstained, but *E. histolytica* alone retained its capacity to stain. *C. A. Hoare*

Bailey, B., Haworth, R. D. & McKenna, J. **The Constitution of Conessine. Part VII. Degradation of some Reduced Quinoline and Indole Bases.** *J. Chem. Soc.* 1954, Mar., 967–76.

McHardy, G. & Frye, W. W. **Antibiotics in Management of Amebiasis.** *J. Amer. Med. Ass.* 1954, Feb. 20, v. 154, No. 8, 646–51.

This paper was read before the Section on Gastroenterology and Proctology at the annual meeting of the American Medical Association in June 1953. After some generalizations on the management and treatment of patients with amoebiasis the authors state that the " eradication of *Endamoeba histolytica* from all persons with the parasites, both those with and without symptoms, is imperative as a public health measure ". They pass on to a consideration of drugs advocated to this end, taking into account both intestinal and extra-intestinal localizations of the infection. Particular attention is paid to the antibiotics, the amoebicidal efficiencies of which are reviewed in the light of investigations both *in vitro* and *in vivo* by sundry authors, as well as by themselves. In their evaluation of therapeutic effect they rank oxytetracycline [terramycin] highly; next to it comes fumagillin and then chlortetracycline [aureomycin]; bacitracin is next, followed by neomycin and chloramphenicol in very inferior positions. Evidence indicates that combined treatment with recognized amoebicides rather than with an antibiotic alone produces the highest proportion of cures; it is restated that hepatitis, hepatic abscess and other extra-intestinal infections with the parasites are not cured by treatment with antibiotics.

There are records of the *in vitro* effect of some antibiotics on cultures of *E. histolytica* grown on a " preconditioned " medium to which penicillin G

in 0·85 per cent. sodium chloride and horse serum was added. "Preconditioning" consisted of culture on a fluid thioglycollate medium of an anaerobic Gram-negative streptobacillus for 24 hours at 37°C.; the centrifuged supernatant was then used for the amoebic culture. Differences in reaction to the various antibiotics were displayed by various strains of parasites *in vitro*, by means of this technique, and certain even showed remarkable resistance to high concentrations of fumagillin. This may account for the fact that certain patients are not cured of their intestinal infections when treated by an antibiotic. *A. R. D. Adams*

MacQuiddy, E. L. **The Treatment of Intestinal Amebiasis with Fumagillin (Fugillin).** *Antibiotics & Chemotherapy.* New York. 1954, Feb., v. 4, No. 2, 178–83.

Eighty-two patients with chronic amoebiasis contracted locally in the Upper Missouri River Basin, where "amebiasis is not too severe" and "cases of true amoebic dysentery are rare" were treated with fumagillin. The gross amounts of drug given ranged from 100 mgm. to 1600 mgm.; the details are set out in tables. Initially 40 mgm. of the drug, in capsules, were given twice daily to a total of 800 mgm., but this caused severe abdominal cramps, nausea and dizziness, and a vesicular rash on the hands and feet; the total dosage was therefore reduced to 200 mgm. similarly given, and the number and severity of the reactions decreased. The bulk of the patients were treated with this latter régime, which caused in some cases mild abdominal cramps, looseness of the bowel, and a mild vesicular rash. In psychoneurotic patients the nervous manifestations increased during the treatment. Though the symptoms attributed to the amoebiasis are not mentioned it is stated that improvement was evident in most cases during treatment; in some it was deferred until after the treatment had finished; in only very few cases was the result of treatment considered to be inconclusive.

Of 32 patients followed up for 90 days, 29 are said to have been freed from parasites, as judged by stool examinations [the number is not stated]. It is concluded that fumagillin is efficient in the treatment of chronic intestinal amoebiasis, and in proper dosage its side-effects are not serious. [For references to previous papers on fumagillin in amoebiasis, see this *Bulletin*, 1954, v. 51, 268.] *A. R. D. Adams*

Yoshimura, B. **Experimental Studies on the Amoebic Liver Abscess. II. Influences of Associated Bacteria and the Decrease of Host-Resistance upon the Production of the Abscess.** *Keio J. of Med.* 1953, May, v. 2, Nos. 1/2, 39–47.

Pursuing his studies on this subject [this *Bulletin*, 1954, v. 51, 61] the author now examines the effect of bacteria when introduced with amoebae in the experimental production of amoebic liver abscesses in rats. Cultured amoebae were freed, by washing in Ringer's solution, as far as possible from their associated bacterial flora. To the amoebae were then added cultures of streptococci, or of staphylococci; the mixed inoculum was then injected directly into the livers of rats. Those rats that survived (14 out of 27) the immediate effects were killed and examined 7 days later; though 9 of the 14 animals so examined had pyogenic liver abscesses, from none of these were amoebae recovered.

As the washing of the amoebae to free them from the associated bacteria in the cultures might have damaged them, the washing was dispensed with and cultures of staphylococci, or of streptococci, were added to the cultured amoebae without other preparation before injection. Of 87 rats so inoculated 32 died and 55 came to autopsy a week after injection; 35 of these had liver abscesses, and amoebae were recovered from 5 of them. Of 31 control rats given injections solely of amoeba culture material 17 came to autopsy; 10 of these had abscesses, and from 2 of these amoebae were recovered. The addition of cultures of the selected bacteria to the inoculated amoebae therefore increased neither the incidence of abscess formation nor the incidence of recovery of amoebae from the lesions.

Neither penicillin nor streptomycin materially affects *Entamoeba histolytica*, but they do affect bacteria. Strains of amoebae (a) growing in mixed bacterial flora, (b) with added staphylococci, (c) with added streptococci, and (d) initiated from bacteria-free cysts, but with added mixed intestinal bacterial flora from rats, were injected intrahepatically into rats. The rats were immediately given 2,000 units of penicillin and 10,000 units of streptomycin intraperitoneally; the antibiotic treatment was repeated after 24 hours. The results are set out in a table; these show that the incidence of abscess production was not decreased, but in all cases the abscesses were very small and they were free from pyogenic pus; no amoebae were recovered from any of them. It therefore seemed that the presence of bacteria was essential for the production of amoebic liver abscesses in rats.

Monobacterial cultures of *E. histolytica* were then developed, the selected accompanying organisms being *Bact. coli* and *Clostridium welchii*. Injection of the former produced a tiny liver abscess in only one rat of 10 injected; this was free from amoebae. Injection of the latter monobacterial culture of amoebae into 48 animals caused the early death of 22; 14 of the remaining 26 had liver abscesses on the 7th day, but none contained amoebae.

Rats were treated orally with carbon tetrachloride (0·05–1·0 ml.) in olive oil to cause liver damage; 48 hours after treatment there was centrilobular liver necrosis. Cultures of amoebae with their associated flora were injected intrahepatically 24 to 48 hours after the drug was given. Of 56 rats so treated 18 survived 7 days; 12 of these had liver abscesses, and from 4 of these amoebae were recovered. The incidence of abscess formation was therefore the same as previously, and so was the incidence of recovery of amoebae.

Mucin, or inulin, when given to mice lowers their resistance to bacterial infections. A half millilitre of a 5 per cent. solution of inulin was injected intraperitoneally into 21 rats before intrahepatic inoculation of a culture of amoebae; of 14 rats surviving 7 days 10 had hepatic abscesses, but no amoebae were recovered from them. In another experiment the inulin injection was repeated for 2 days before the introduction of the amoebae, but the end result was similar; injection of inulin for 3 instead of 2 days produced a like result. *A. R. D. Adams*

Miller, M. J. **Bacteria-Free** *Entamoeba invadens*. [Correspondence.] *Nature*. 1953, Dec. 26, v. 172, 1192–3.

Since the study of the factors influencing the host-parasite relationship in amoebiasis has been hampered by failure to grow *Entamoeba histolytica* in pure culture without accompanying bacteria, any success obtained with related amoebae has a direct bearing on this problem. In the present paper

the author reports the cultivation of the reptilian parasite, *E. invadens*, for over 2 years in bacteria-free medium, consisting of 0·75 per cent. saline with à piece of hamster liver measuring 8–64 cmm. These cultures remain viable at room temperature up to 10 weeks, but subcultures are usually made every 3–4 weeks. The amoebae will also grow in crushed liver, in liver suspension and in the supernatant fluid after the latter is centrifuged, but the growth-promoting substance in the liver is not dialysable. Heating for 5 minutes at 100°C. inactivates this medium, but heating at 56°C. for 30 minutes is not detrimental to the growth of amoebae.

Since snakes are susceptible to experimental infection with such pure cultures of *E. invadens*, they can be used for the study of the pathogenesis of amoebiasis, uninfluenced by the accompanying flora.

[No mention is made of earlier work on this subject by Lamy (this *Bulletin*, 1952, v. 49, 145), who obtained similar results with this amoeba.]

C. A. Hoare

ERRATUM

The presence of an error in a wartime issue of the *Bulletin* has recently been brought to the notice of the Editor. As this concerns the dosage of acranil in the treatment of giardiasis, the following correction should therefore be made.

In the abstract of a paper by de Muro in this *Bulletin*, 1940, v. 37, 378, the sentence on line 3 beginning " The tablets contain each half a gramme of the drug " should read " The tablets contain each 0·1 gm. of the drug ".

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Geigy, R., Wagner, O. & Aeschlimann, A. Transmission génitale de *Borrelia duttoni* chez *Ornithodorus moubata*. [**The Genital Transmission of** *Spirochaeta duttoni* **in** *Ornithodorus moubata*] [Miscellanea] *Acta Tropica*. Basle. 1954, v. 11, No. 1, 81–2.

The authors confirm the well-known fact that *Spirochaeta duttoni* is transmitted to the offspring of infected *Ornithodorus moubata*, but also stress that transovarian transmission is a better term than hereditary transmission. They found that approximately 50 per cent. of the nymphs raised from eggs laid by infected parents contained spirochaetes.

Attempts were made without success to infect females by copulation with infected males. Eighty-two male ticks were fed on infected mice, and when examined on the 5th–6th day large numbers of spirochaetes were found surrounding the testes and other male genital organs. These were used to fertilize 108 uninfected females, none of which acquired infection. It is suggested that the spirochaetes remain in the layers of the tissue surrounding the male genital glands and do not enter the spermatophore.

E. Hindle

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

de Menezes, D. Lepromino-reação em doentes e comunicantes de lepra no Município de Uruguaiana (Rio G. do Sul). (Observação de 4 casos de viragem do Mitsuda pelo BCG.) [**The Lepromin Reaction in Patients and Contacts in the Municipality of Uruguaiana (Rio Grande do Sul). Observations on 4 Cases in which the Mitsuda Reaction was Reversed After BCG**] *Rev. Brasileira Leprologia.* S. Paulo. 1953, Sept., v. 21, No. 3, 195–202, 1 fig. & 2 graphs.

The lepromin test was done on 23 leprosy patients and on 66 contacts with leprosy. In the lepromatous type the reaction was negative in all, and all were bacteriologically positive. In the undifferentiated form 100 per cent. were lepromin positive and 80 per cent. bacteriologically negative. In the tuberculoid form all were lepromin positive and bacteriologically negative. In reacting tuberculoids 66·7 per cent. were lepromin positive and all were bacteriologically positive. Among the contacts 94 per cent. were lepromin positive. It was found that among the contacts of lepromatous cases only 88·6 per cent. were lepromin positive, whereas among contacts of others forms of leprosy 100 per cent. were positive. This is taken as a possible indication that constant superinfection may lead to the conversion of positive into negative lepromin reactions.

Three cases are recorded in which negative or doubtful Mitsuda reactions became positive at varying intervals after BCG vaccination in 2 infants and a child of 5. In a fourth case, a woman of 22 with "indeterminate" leprosy, a similar reversion occurred. *Ernest Muir*

Duarte, L. G. & de Mello, P. H. O 4:4'-diamino-difenil-sulfona no tratamento da lepra lepromatosa. [**Dapsone in the Treatment of Lepromatous Leprosy**] *Rev. Brasileira Leprologia.* S. Paulo. 1953, Sept., v. 21, No. 3, 207–20. [40 refs.]

First the literature of sulphones is reviewed. Then an account is given of 90 cases of leprosy treated with dapsone (DDS). The daily dose given orally was 100 to 200 mgm., the latter being tolerated when 42 days of treatment was followed by 15 days' rest. Having formerly used Promin, Diasone and other DDS derivatives, the author considers that because of its efficiency, ease of administration and moderate price, DDS is the treatment of choice for leprosy. *Ernest Muir*

Laviron, P., Lauret, L. & Jardin, C. Contribution à l'étude de la chimiothérapie-retard dans la lutte antilépreuse en Afrique Occidentale Française. Les suspensions de diaminodiphénylsulfone en injections bimensuelles. [**Contribution to the Study of Delayed-Action Chemotherapy in the Antileprosy Campaign in French West Africa**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 127–39, 6 figs. & 6 graphs.

Because of the long distances that have to be covered in Africa a twice-monthly injection of DDS is given. Two suspension media have been used,

groundnut oil and chaulmoogra ethyl esters. The latter is preferred as the curve of blood concentration remains more level during the time between the injections. The rate of absorption can also be regulated by the size of crystals used in the suspension. The dose of 1·25 gm. twice a month appears to be sufficient and is not toxic for the African. Details are given of 10 patients treated and an addendum sets out the technique used for estimation of DDS in the blood and in the urine. *Ernest Muir*

Floch, H. & Gélard, A. Utilisation de la DDS-retard en fonction de la grosseur des cristaux de la suspension. [**The Use of Delayed-Action DDS in Relation to the Size of Crystals in the Suspension**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 35–40.

The authors aim at giving patients 1·5 gm. every 3 weeks in suspension in 0·2 per cent. agar saline. They find that the larger the DDS crystals in the suspension the more slowly is the drug absorbed. The dosage given amounts to 0·5 gm. intramuscularly per week; the amount recommended at the Madrid Congress was between 0·3 and 1·2 gm. per week. The authors give 50 mgm. a week for the first month, 1·0 gm. per fortnight for the second 2 months, and then 1·5 gm. every 3 weeks. They find that on the day after the injection there is a blood concentration of 0·460 mgm. per 100 cc. which gradually diminishes but is 0·100 mgm. per 100 cc. on the 21st day. The rate of absorption can be regulated by increasing or diminishing the size of the crystals in the suspension. *Ernest Muir*

Lippelt, A. BCG e eritema nodoso em doente de lepra. [**BCG and Erythema Nodosum in Leprosy**] *Rev. Brasileira Leprologia.* S. Paulo. 1953, Sept., v. 21, No. 3, 221–4.

Two hundred adult lepromatous patients who had been on sulphone treatment and had improved to a greater or less degree were given 3 gm. of BCG in weekly doses of 200 mgm. by mouth. Some improved and were able to go back to work, but in many there were exacerbations and attacks of erythema nodosum. On the whole the results were not very encouraging. *Ernest Muir*

Jopling, W. H. & Ridley, D. S. **Isoniazid in Lepromatous Leprosy.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1954, Mar., v. 48, No. 2, 132–8. [10 refs.]

Eight lepromatous patients were treated for a period of 6 months with isoniazid. Some of them had already been treated with sulphones with poor results. Clinical notes of the 8 patients and laboratory findings are given. The usual daily dose was 1 to 2 mgm./kgm. increasing gradually to 5 mgm./kgm., but there was variation in the amounts tolerated. In all cases there was a certain amount of lepra reaction, so severe in 2 cases that treatment had to be temporarily suspended. There was no evidence of clinical improvement in any of the patients, and though there seemed to be bacteriological improvement in some, it was not maintained. The conclusion confirms the view of Lowe [this *Bulletin*, 1953, v. 50, 127] and others that under the conditions of trial isoniazid is not an effective treatment for lepromatous leprosy. *Ernest Muir*

Sharp, L. E. S. **A Trial of Iso-Nicotinic Acid Hydrazide in Leprosy.** *East African Med. J.* 1954, Feb., v. 31, No. 2, 59–62.

During 5 months 18 lepromatous and 5 tuberculoid cases of leprosy were treated with isoniazid, 200 mgm. being given daily. The results were that 87 per cent. were much improved or improved, and 13 per cent. were stationary. This computation is based on clinical results, and no mention of bacteriological examination is made. At the same time, and acting as controls, the following number of cases were treated with other drugs, the percentage improvement being shown in brackets: 121 with DDS (84), 128 with DDS and intradermal chaulmoogra oil (95), 27 with thiosemicarbazone (89), 45 with thiosemicarbazone and chaulmoogra (89) and 38 with sulphetrone (87). The conclusion reached is that " although these observations on isoniazid in the treatment of leprosy cover only twenty-three cases, yet the marked improvement observed in a good proportion of the cases, particularly the highly infected ones, gives some solid ground for concluding that this drug has a definite therapeutic value in such cases. It will further be noted that the results obtained with izoniazid have been approximately as favourable as with other forms of treatment. It deserves a more extensive and prolonged trial, by itself and also in combination with chaulmoogra oil intradermally." *Ernest Muir*

Markianos, J. Action thérapeutique de l'hydrazide de l'acide isonicotinique dans la lèpre. [**The Action of Isoniazid in the Treatment of Leprosy**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 32–4.

The author treated with isoniazid 2 patients having combined leprosy and tuberculosis with no amelioration of the tuberculosis but with slight improvement of the leprous lesions. In 13 patients with leprosy alone, of the macular type, there was some improvement, especially in recent cases. In 25 more advanced lepromatous cases there was slight improvement, and the author considers that this drug may be used when there is intolerance of the sulphones. In all, 45 patients were treated. Three of these were attacked by jaundice which lasted 2 to 3 months, and there were various other reactionary complications requiring withdrawal of the drug. These were observed most commonly when the daily dose was increased from 150 mgm. to 300 mgm. and maintained at that level. [The author does not use the modern form of classification.] *Ernest Muir*

Picarelli, J. O sigilo e a notificação na lepra. [**Segregation and Notification in Leprosy**] *Rev. Brasileira Leprologia.* S. Paulo. 1953, Sept., v. 21, No. 3, 227–44.

This is a plea for a reversal of the present system of compulsory segregation at present practised in Brazil. Among the arguments used is the change in the patient's personality caused by the stigma and by separation from society, and the tendency for patients to hide their disease as long as possible and thus be a danger to contacts. Instead of this, isolation should be encouraged on a domiciliary basis, as far as possible with adequate inspection to see that patients carry out the rules. This should be easier to make effective with the new forms of treatment now available.

Ernest Muir

Hadler, W. A. Comportamento do cobaio e do rato, normais, injetados com " lepromina " por via intradérmica. [**Behaviour of Guineapigs and Rats when Injected Intradermally with Lepromin**] *Rev. Brasileira Leprologia.* S. Paula. 1953, Sept., v. 21, No. 3, 165–94, 1 graph & 16 figs. [64 refs.] English summary.

Intradermal injections of lepromin antigen were given to 174 guineapigs and 95 rats. Of the guineapigs 44 were studied histologically as were 35 of the rats, the rest being observed macroscopically. In both types of animal there was an initial acute phase, less intense in the rats. This was followed by a chronic phase which showed marked differences in the 2 species. In the guineapig the connective tissue fixed cells were " activated " and developed into fixed macrophages which phagocytosed the bacilli and then developed into epithelioid cells, the whole forming a granulomatous structure which resolved between the 40th and 90th days. The fixed cells of the rat after phagocytosing the bacilli stored them without destroying them, and the number of stored bacilli increased so that the macrophage was changed into a " rat lepra cell ". These cells, showing numerous bacilli within, were arranged in the form of nodules and remained until the 90th day, showing very slow involution.

Thus these 2 forms of reaction resemble the 2 principal histological appearances found in the disease in man, that in the guineapig resembling the tuberculoid lesion and that in the rat the lepromatous lesion. This goes to suggest by analogy that in man the destruction of bacilli and the type of tissue reaction depend to a great extent on natural resistance to leprosy.

Ernest Muir

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—Trematodes (*schistosomes, other flukes*); Cestodes (Diphyllobothrium, Taenia, Echinococcus, *other cestodes*); Nematodes (*Hookworms*, Ascaris, *Filarial worms*, Dracunculus, *etc.*, Trichuris, Enterobius, Trichinella, *etc.*).

Schwetz, J. Sur les causes de la confusion dans la nomenclature des mollusques transmetteurs des bilharzioses en Afrique éthiopienne et sur la nécessité et les moyens d'y mettre fin. [**The Causes of Confusion in the Nomenclature of Mollusc Vectors of Schistosomiasis in Africa and the Need and Means of Ending It**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 5, 765–83, 2 figs.

The author deplores the confusion and multiplicity of synonyms which surround the African planorbids. He states that if 2 identical molluscs are sent to 2 independent experts for identification, it often happens that 2 different identifications are made. This state of affairs does not exist in medical entomology. By comparing the development of the taxonomy of molluscs with that of arthropods the author traces the origin of the difficulties concerning snails. Most molluscan studies have been concerned with shells alone but insufficient attention has been paid to the effect of age upon shell morphology, and to ecological influences, *e.g.*, food availability, calcium content of water, etc., in determining the shape and size of shells.

In consequence, identical snails of different ages and from different sources have sometimes been given separate specific names. The author has proposed, therefore a nomenclature on an ecological basis. He comments on the proposition of the World Health Organization that malacologists should examine the whole body, and not the shells, in order to determine if the names in use at the present time do represent true species, but he does not think that anatomical examination *per se* will resolve the problem. In order to recognize those planorbids which transmit schistosomes, he believes that it will be necessary always to refer to external characters whether these correspond to internal differences or not. The conclusion is reached that the classification of molluscs should be considered in its medical, conchological, malacological and ecological aspects by an expert committee in order to decide upon a satisfactory nomenclature which will simplify the identification of the vectors of schistosomiasis. In a post-script he emphasizes that the problem of classification and nomenclature of the Buliminae is equally confused. *R. B. Griffiths*

Markowski, S. **The Distribution of the Molluscan Vectors of Schistosomiasis in the Sennar Area of the Sudan, and their Invasion of the Gezira Irrigation System.** *Ann. Trop. Med. & Parasit.* 1953, Dec., v. 47, No. 4, 375–80, 1 map.

"Analysis of the distribution of snails in the Gezira irrigation system suggests that the main factor responsible for the invasion of the area by the molluscan vectors of schistosomiasis is a physical one, namely the current of the Blue Nile, which carries them down to the Sennar reservoir and thence through the main canal into the subsidiary water-courses; biological factors probably play little or no part in the invasion." Although the invasion of the man-made irrigation system of the Gezira is thus achieved by mechanical means the subsequent establishment, multiplication and progress of the invading snails are dependent on their reaching suitable biological environments, and the nature of these environments varies with the particular species of snail. "In the main canal from Sennar to Muzeiqila, the negligible number of *B. truncatus* found is due to the fluvial character of that part of the canal, to the velocity and depth of the water, and to the absence of vegetation. This sector of the canal thus acts as a channel for the peripheral transfer of the snails into the irrigation system, and the few specimens found were merely individuals caught on their way through by clumps of grass which had escaped removal in the dredging operations. *B. truncatus* seems to be a rather 'sedentary' form: it is carried on debris to certain areas, and there, having found a suitable environment, it multiplies among the aquatic vegetation. In places where the water is overgrown with *Juncellus*, snails appear to be absent.

"The distribution of P. boissyi begins immediately beyond the sluices of the Muzeiqila pumping-station and extends to the northern end of the main canal. No specimens were found in the Sennar reservoir or in the main canal between Sennar and Muzeiqila. Its sudden appearance at Muzeiqila is probably due to 'migration,' for it can travel for long distances floating on the surface of the water, either propelled by the breeze or carried by the current, provided that the waves are not too violent and the breeze not too strong. In high wind the snail sinks to the bottom, rising again when conditions improve. Its migratory habit explains its absence upstream to Muzeiqila and in the Sennar reservoir. The species appears to require a stagnant or quiescent environment, and if the water is moving the current

carries the snails along until a site is reached where vegetation gives shelter and protection. The whole stretch of the main canal from Muzeiqila to its northern termination offers suitable environmental conditions, and there the species is more prevalent than *B. truncatus.*"

The distribution of these 2 species of snails, when considered in relation to the chances of contact of the human population with the water in which the snails live, determines the distribution of schistosomiasis in the Gezira.

R. M. Gordon

Makar, N. **Some Observations on the Surgical Treatment of Cancer of the Bilharzial Bladder.** *J. Egyptian Med. Ass.* 1953, v. 36, No. 12, 762–78, 9 figs. on 4 pls.

São Paulo: Sociedade de Gastroenterologia e Nutrição. Esquistossomose mansoni no Brasil. (Doença de Manson—Pirajá da Silva.) [Debates promovidos pela Sociedade de Gastroenterologia e Nutrição de São Paulo, sob o patrocínio da Federação Brasileira de Gastroenterologia. (São Paulo, 27 e 28 de outubro de 1952.)] 1953. [**Schistosomiasis Mansoni in Brazil: Report of a Conference**] 187 pp., numerous figs. [Numerous refs.]

This publication consists of papers presented at a meeting (27 and 28 October 1952, São Paulo) devoted to *S. mansoni* schistosomiasis in Brazil, when honour was paid to Professor Pirajá da Silva who, in 1908, first reported the presence of intestinal schistosomiasis in the north-east of Brazil. In 17 papers the clinical and pathological aspects of the disease, its diagnosis, treatment and prevention are dealt with by the foremost Brazilian workers. The following subjects were dealt with: plan of research applied in combating *S. mansoni* schistosomiasis; schistosomiasis and environmental sanitation; schistosomiasis in the negro; clinical forms; the hepatosplenic syndrome in schistosomiasis; rectal biopsy in diagnosis; biological tests in diagnosis; appraisal of diagnostic methods; biology of the planorbids; experimental schistosomiasis; pathological anatomy; objections to the practice of so-called "specific treatment"; plan of mass treatment; late results in the specific treatment; the present position of specific therapy; plan of prophylaxis of. Each paper is followed by a series of questions and answers which summarize the discussions that followed its presentation.

The following is a free translation of the recommendations of the rapporteurs.

Epidemiology

(1) In epidemiological surveys of *S. mansoni* schistosomiasis, cases should be classed in accordance with uniform clinical forms or types, in order that the gravity of the disease in the various endemic zones of the country may be assessed.

(2) Epidemiological surveys should include not only the infection rate of the population, but also a study of the snails of the region and the *S. mansoni* infection rate among the snails.

(3) In representative samples in such surveys, a study should be made of the predominant anaemia, based upon the estimation of haemoglobin by photoelectric methods and red-cell counts and cell-volume determinations (haematocrit), so that the other haematological indices may be calculated.

(4) In such surveys, the principal economic and social factors, such as unhealthy habits, unhygienic dwellings, work in polluted waters, poverty, etc., which play a part in the spreading or aggravation of the disease, should be investigated.

(5) In view of present knowledge of schistosomiasis, encouragement should be given to research in the institutes directly connected with the schistosomiasis campaign and also investigations by other recognized organizations to assist the campaign should be utilized and assisted.

Prophylaxis

(1) Courses should be held for the training of technicians in prevention of schistosomiasis.

(2) Special attention should be given to the study of molluscicides to assess their real value and their suitability for large-scale application.

(3) Prophylaxis of schistosomiasis, in view of present-day knowledge, should be started in the state capitals and large cities where the disease is still endemic, and, with the knowledge there gained, methods should be developed for the less important centres and rural zones.

(4) Owing to the preponderating rôle which will be played in this campaign by sanitary engineering, all the necessary resources should be made available to this branch for the development of the hygiene of endemic areas.

(5) The prophylaxis of schistosomiasis in rural zones should be carried out through the agency of posts having technical staff, equipment, drugs and transport adequate for the campaign.

(6) The schistosomiasis prophylaxis posts should also undertake the diagnosis, treatment and prophylaxis of other intestinal helminthic and protozoal infections.

(7) Some of the schistosomiasis prophylaxis posts should be sited in the periphery of the endemic zones wherever autochthonous cases of that disease occur. This is to produce a line of protection against the dissemination of the disease.

(8) The schistosomiasis campaign should be adequately financed.

(9) In the schistosomiasis campaign facilities should be created for admission to hospital and treatment of all patients needing these measures.

Pathology and Clinical Treatment

(1) The study of pathology should be encouraged in the experimental field and in man, for the elucidation of innumerable obscure points, by the mobilization of investigators from official and private organizations.

(2) Clinical studies should be undertaken to improve methods of diagnosis and treatment of the disease, to spread knowledge of such methods and to train doctors and technicians suitably equipped to assist the thousands of patients in the country.

Treatment

(1) The administration of effective schistosomicidal doses of antimonials or of thioxanthone derivatives is limited by risks and objections.

(2) Of the trivalent antimonials at present in use, for intravenous administration, sodium-antimony gluconate [original has gliconató] is that showing the best tolerance. Even so, it does not give better results than those obtained with sodium antimony tartrate or potassium antimony tartrate.

(3) Trivalent antimonials for intramuscular injection (antimony pyrocatechol sodium disulphonate and antimony lithium thiomalate) are at present considered of most use.

(4) The thioxanthone derivatives are considered, at present, to be of low efficiency in curing the disease, since their low tolerance prevents their use in efficient schistosomicidal doses. It is, however, desirable that derivatives

of this chemical series of greater tolerance be found, which may thus become valuable in the campaign against the disease.

(5) Trials with the combination of the trivalent antimonials, principally of those for intramuscular use, with Miracil D. should be encouraged.

(6) Mass treatment of *S. mansoni* schistosomiasis for prophylactic purposes is not advisable, in view of the low efficiency found in other countries.

(7) The evidence of damage to the liver, due to the death of the worms, following the specific treatment of intestinal schistosomiasis, was not considered sufficient to contraindicate specific treatment. Further studies were required to elucidate this problem.

(8) The surgical treatment of the portal hypertension associated with *S. mansoni* schistosomiasis and the indications for porto-cavalvenous "shunt" and splectomy were considered. These operations can benefit patients and should be carried out after a careful consideration of the conditions peculiar to each case.

[Summaries in English of the most important points of wide application in each paper would have greatly extended the value of this excellent publication. Workers outside Brazil need to know of the work being done in that country.] *C. J. Hackett*

Pessôa, S. B. Nota sôbre a ação cercaricida de corantes fotodinâmicos. [**Photodynamic Cercaricidal Action of Certain Dyes**] *Folia Clin. et Biol.* S. Paulo. 1952, Dec., v. 18, No. 3, 133–5.

More than 20 years ago the author reported the lethal action of certain dyes on mosquito larvae, through the effect of the sun's rays [see this *Bulletin*, 1931, v. 28, 833]. He has now tested the effect of 4 of these dyes—eosin, erythrosin, Congo Red and methylene blue, chemically pure—on cercariae of *Schistosoma mansoni*. The solutions were made in distilled water, *p*H 7, and controls were kept in the dark under similar conditions. The results are presented in 4 tables, eosin and Congo Red diluted up to 10^{-4}, erythrosin and methylene blue up to 10^{-6}. These show that eosin and Congo Red have practically no lethal action; erythrosin and methylene blue are fatal after 20 minutes' exposure to the sun, when they are diluted to 10^{-5}, and some were killed by erythrosin in as low a dilution as 10^{-3} in 5 minutes and 10^{-4} in 10 minutes; methylene blue in a dilution of 10^{-4} in 5 minutes' exposure. The author has not yet had an opportunity of testing these colouring matters under natural conditions in clear unshaded streams.
H. Harold Scott

Pessôa, S. B. Notas sôbre algumas substâncias moluscocidas. [**Notes on Certain Molluscicides**] *Folia Clin. et Biol.* S. Paulo. 1952, Dec., v. 18, No. 3, 137–41.

For a molluscicide to be serviceable it must kill the mollusc but be harmless to fish and animals. The author has tried 18 reputed molluscicides, making solutions or emulsions, according as they are soluble or insoluble, in water, in submultiples of 10, in tubes containing 40–50 cc. of the fluid, adding to each 4 or 5 *Australorbis glabratus*, keeping them at laboratory temperature (26–30°C. in Aracajú), and examining them after 1, 3 and 24 hours to ascertain whether they were killed or were still living. The results of all 18 are given as brief notes in the text, but only 3 are worthy of special mention: sulphate of copper, pentachlorophenol and Zephirol. The last-named proved weaker than either of the other two; a dilution of 10^{-5} killed the molluscs in 24 hours, but 10^{-6} did not. *Copper*

sulphate in a dilution of 10^{-4} killed in 1 hour, 10^{-5} in 3 hours and 10^{-6} killed 30 per cent. in 24 hours; it was ineffectual in 3 hours. *Pentachlorophenol* was equally effectual as, in fact more effectual than, the copper sulphate in the long run, but not in the shorter times. Thus, in a dilution of 10^{-4} and even 10^{-5} the molluscs were alive after 3 hours, but were dead in 24 hours, and 10^{-6} killed 70 per cent. in the 24 hours. The copper sulphate is, therefore, quicker in action and the author concludes that when the water is flowing, as in drains and ditches, this salt should be preferred, as it acts more quickly, but in stationary waters (*aguadas paradas*) pentachlorophenol is better, as it acts in higher dilution, though more slowly. *H. Harold Scott*

Teichler, G. H. J. Bemerkungen zur Rinde von Albizzia anthelmintica als Bandwurmmittel. [**Observations on the Bark of** *Albizzia anthelmintica* **as a Remedy for Tapeworm Infections**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1954, Jan., v. 5, No. 1, 131–3.

The author discusses the use in South-west and East Africa of the bark of the tree, *Albizzia anthelmintica*, which was originally apparently brought to South-west Africa from Abyssinia. The dry, powdered bark is much more effective than infusions of it and the author reports on his successful use of this for the treatment of tapeworm infections. He has not noted any ill-effects of the bark, and a boy, aged 5, took full doses of it without ill-effects. One or two teaspoonfuls of the powdered bark are taken before meals followed by a drink of water and the tapeworm is expelled up to 3 to 4 days later; but the worm may be partly or wholly dissolved and it may not be seen. No statistics or other figures relating to the cases treated are given. Saponin, which is not an anthelmintic, has been found in the bark, but the anthelmintic principle in it is not known. *G. Lapage*

Daugherty, J. W. **Synthesis of Amino Nitrogen from Ammonia in** *Hymenolepis diminuta*. *Proc. Soc. Exper. Biol. & Med.* 1954, Feb., v. 85, No. 2, 288–91, 1 fig.

Matilla, V., Aparicio Garrido, J. & Prieto Lorenzo, A. Parásitos asociados al "Ancylostoma duodenale" en la huerta del Jarama (Madrid). [**Parasites Associated with** *Ancylostoma duodenale* **in the Gardens of Jarama, Madrid**] *Med. Colonial.* Madrid. 1954, Mar. 1, v. 23, No. 3, 209–11.

This paper gives briefly the information previously reported in a study of this focus in Madrid [this *Bulletin*, 1951, v. 48, 662; 1952, v. 49, 1050]. It is added that in more than 16 per cent. of cases double infections were noted: in 6 cases there were three parasites and in 2 cases there were 4. The difficulties of clinical diagnosis and of treatment in these mixed cases are stressed. *H. J. O'D. Burke-Gaffney*

Sadun, E. H. & Vajrasthira, S. **The Effect of Maklua** (*Diospyros mollis*) **in the Treatment of Human Hookworm.** *J. Parasitology.* 1954, Feb., v. 40, No. 1, 49–53. [12 refs.]

The authors quote literature on the common occurrence of hookworm infections in Thailand. Hexylresorcinol is, they say, the drug of choice for treatment, but mass treatment is difficult and expensive in Thailand and, seeking for another drug, they chose for trial Maklua, which is derived from

the berries of the plant *Diospyros mollis* (Family Ebenaceae) [tropical hardwood trees, of which the ebony tree is an example], which are common in Thailand. Maklua has been used by local herb-doctors and by general practitioners and the staff of hospitals for many years for the treatment of intestinal diseases. Good results have been reported so long as the berries used are green. The active principle in the berries is not known, but there is no evidence that the berries are toxic.

The authors treated 112 patients. The stools were examined by the salt-flotation concentration method of Willis [this *Bulletin*, 1922, v. 19, 246] and by the dilution method of Stoll and Hausheer [*ibid.*, 1926, v. 23, 776]. Maklua was prepared by washing and crushing 1,000 berries weighing 4,380 gm. and mixing with 1 litre of coconut milk. The mixture was pressed and filtered through gauze and the filtrate made up to 3 litres in coconut milk and cane sugar. The dose was 3 ml. per year of age and was given on an empty stomach up to a maximum of 75 ml. No purgative was given after the dose, because Maklua is itself a purgative. Some patients were given hexylresorcinol as controls. The results are shown in the following table:—

Number treated	*Eggs per ml. formed faeces*		*Results*					
			6 days			*90 days*		
	average	*range*	*Stoll* +	*Willis* +	*Eggs per ml. average*	*Stoll* +	*Willis* +	*Eggs per ml. average*
63, Maklua	1720	600–8000	9	22	71			
16, Maklua (children)	4740	1200–11,600	0	5	31	1	9	75
23, Hexyl-resorcinol	4780	1000–15,800	7	19	187	12	19	370

Among the schoolchildren in experiment 2, *Ascaris lumbricoides* was present in 18 and *Trichuris trichura* in 15. Treatment with hexylresorcinol resulted in "negative smears" for Ascaris 6 days after treatment in 9 out of 10 patients, and 7 were still negative 90 days after treatment. Treatment with Maklua resulted in "negative smears" for *Ascaris* in 6 out of 8 patients. 4 of whom were still negative 90 days later. Of the patients treated with Maklua 4 out of 6 patients with *Trichuris* were positive both 6 and 90 days after treatment. In the group treated with hexylresorcinol 7 out of 9 with *Trichuris* were positive 6 days after treatment and 8 out of 9 were positive 90 days after treatment.

The authors suggest that these preliminary results should be treated with great caution, because so far only very limited work has been done.

G. Lapage

Izumi, S. **Biological Studies on *Ascaris* Eggs. IV. *Ascaris ontogenesis* observed by Nucleic Acid Stainings, and Distribution of Fat or Glycogen following the Development of *Ascaris* Eggs.** *Japanese J. Med. Sci. & Biol.* 1953, Aug., v. 6, No. 4, 371–83, 25 figs. on 3 pls. [17 refs.]

Izumi, S. **Biological Studies on *Ascaris* Eggs. V. On the Staining Reactions of *Ascaris* Eggs to Phosphor, Calcium and some other Substances in the Process of their Oögenesis.** *Japanese J. Med. Sci. & Biol.* 1953, Aug., v. 6, No. 4, 385–8.

Jelliffe, D. B. ***Ascaris lumbricoides* and Malnutrition in Tropical Children.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1953, Dec., v. 5, No. 4, 314–20, 3 figs. [38 refs.]

This paper is chiefly valuable for the collection of references to papers on the effects of *Ascaris* infection on nutrition. There is no doubt that

there are many ways in which infection *may* contribute to malnutrition, but how important each is remains, as yet, an unsolved problem. There is also a report of a 4-year-old Jamaican boy, who weighed just under 11 kgm. He maintained this weight on the hospital diet for 2 weeks and was then wormed. As a result, 120 adult *Ascaris* weighing 200 gm. were passed. In the next 3 weeks on the same diet, he gained about 2·5 kgm. It is calculated that these worms may have laid daily eggs containing up to 0·32 gm. of nitrogen, which was lost in the faeces. This may represent a deflection of an important moiety of the protein intake. *R. Passmore*

See also p. 681, Torrealba *et al.*, La Iloticina y la enfermedad de Chagas. Otros experimentos con el mismo antibiótico [**Ilotycin (Erythromycin) in Chagas's Disease and Some Other Conditions**]

Bruyning, G. F. A. **Some Data on the Filaria Vector** *Culex quinquefasciatus* **Say in Paramaribo.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1953, Dec., v. 5, No. 4, 333–8, 4 figs.

Examination of nearly 51,000 persons in Paramaribo, Surinam, during 1948–49 revealed that 17 per cent. of the inhabitants showed microfilariae of *Wuchereria bancrofti* in the blood, and that 7 per cent. had clinical symptoms though no microfilariae were found in their peripheral blood.

The Bureau of Public Health then commenced large-scale treatment of the people by diethylcarbamazine and the examination of the mosquitoes. The mosquitoes found in 1950 and 1951 were respectively *Culex quinquefasciatus* [*C. fatigans*] 6,498 and 3,670, *Aëdes aegypti* 74 and 11 and *Mansonia titillans* 1 and 1. The mosquitoes were kept alive for a week before being dissected. Only the *Culex* mosquitoes were found infected.

In one area in the city the parasite indices for *Culex fatigans* before and after the first stage of the campaign were 25·6 per cent. (of 1,187) and 6·3 per cent. (of 875) respectively. In some central areas where the population had the opportunity of free treatment, the following figures were obtained: 122 positive out of 1,375 = 8·9 per cent. infected; 155 out of 1,231 = 9·3 per cent.; 73 out of 437 = 16·7 per cent. and in a suburb 14 out of 371 = 3·8 per cent. positive.

After the first treatment in 1950, the average parasite index of the city as a whole was 9·7 per cent.; in 1951, it was 8·7 per cent. so there was little change.

Data are also given for the localization of the various filarial embryos in the mosquito and for the average numbers per mosquito. *H. S. Leeson*

McFadzean, J. A. & Hawking, F. **Arsenamide Treatment of Filariasis due to** *W. bancrofti* **and** *A. perstans*. *Brit. Med. J.* 1954, Apr. 24, 956–9. [11 refs.]

Arsenamide is a trivalent arsenical and is *p-bis* (carboxymethyl-mercapto)-arsino-benzamide. The authors used it in the treatment of 32 patients with *W. bancrofti* infections in the Gambia. The dosage was 125 mgm. (1·8–2·5 mgm./kgm.) daily by intravenous injection, usually for 10–12 doses. The treatment removed the majority of the microfilariae of *W. bancrofti* from the blood within 2 weeks after the first dose, and all but 2 patients were free from microfilariae 6 months later. From this evidence it is concluded that the treatment either killed or sterilized the adult worms and it also exterminated many of the microfilariae. The treatment also

brought about a significant reduction in the numbers of microfilariae of *Dipitalonema perstans* present, which is taken to indicate a filaricidal action on the species as well. The great drawback is that, as emphasized by previous workers on this drug, arsenamide has a toxic effect upon the liver. In 2 patients treatment was followed by jaundice 3 days and 4 weeks respectively after the last injection and one patient developed fatal necrosis of the liver after only 3 injections.

Minor toxic effects included vomiting, dizziness, headache and loss of weight. A few patients showed localized allergic reactions, apparently around dead worms.

In 5 additional patients treated with lower doses (0·3 mgm./kgm.) daily for 14 days under medical supervision with a protein-rich supplement, no toxic results were observed. In 4 patients followed for 5 months the microfilarial count was reduced almost to zero in 2, fell to one-quarter in one and remained unchanged in one. The minimum curative dose is perhaps about 0·6 mgm./kgm.

Two patients were treated with 4 gm. and 5 gm. respectively of suramin (antrypol) for trypanosomiasis and this had no apparent effect on the numbers of *W. bancrofti* microfilariae in their blood. *Philip Manson-Bahr*

ERRATUM

In the abstract of a note by Reid in this *Bulletin*, 1953, v. 50, 434, and in the abstracter's comment on a note by Kartman in this *Bulletin*, 1954, v. 51, 200, reference is made to microfilariae of *W. bancrofti*. This is incorrect, as the work as described was carried out with *W. malayi*.

Kershaw, W. E., Keay, R. W. J., Nicholas, W. L. & Zahra, A. **Studies on the Epidemiology of Filariasis in West Africa, with special reference to the British Cameroons and the Niger Delta. IV. The Incidence of *Loa loa* and *Acanthocheilonema perstans* in the Rain-Forest, the Forest Fringe and the Mountain Grasslands of the British Cameroons, with Observations on the Species of *Chrysops* and *Culicoides* found.** *Ann. Trop. Med. & Parasit.* 1953, Dec., v. 47, No. 4, 406–25, 8 figs. on 2 pls., 2 text figs. & 1 map.

" 1. The equilibrium attained between the parasitic combinations involving *Loa loa* and *Acanthocheilonema perstans* and their environment can be assessed by the incidence of the infections in man.

" 2. A description is given of the vegetative features of mangrove swamp, of rain-forest, of the transitional zone of savannah with relict forest, and of the several types of mountain vegetation which occur in the British Cameroons.

" 3. The results are given of surveys of the incidence of infection with *L. loa* and *A. perstans* among the different age-groups of the human population of villages in the rain-forest, in the mountain grasslands, and in the two transition zones—the abrupt forest fringe on the escarpment of the western side of the Cameroon range of mountains, and the gradual-transition zone of savannah with patches of relict forest on the eastern slopes of the range.

" 4. The incidence of infection with *L. loa* is high in the rain-forest, where *Chrysops silacea* and *C. dimidiata* (both proven vectors of the infection) are present. In the abrupt forest fringe, where an additional fringe species, *C. zahrai*, also occurs, the incidence falls. In the gradual-transition zone,

where nothing is known of the species of *Chrysops* which may occur, it is absent. And in the grasslands, where no *Chrysops* are found, it is also absent.

" 5. The incidence of infection with *A. perstans* is high in the rain-forest, where *Culicoides grahamii*, *C. inornatipennis*, *C. austeni* and *C. fulvithorax* are present. In the abrupt forest fringe, where the population of *C. austeni* (a proven vector of the infection) appears to be low, the incidence falls at the approaches to the fringe, though not so rapidly as infection with *L. loa*. In the gradual-transition zone, where both *C. grahamii* and *C. inornatipennis* occur, infection is still present, though individual infections may have been acquired elsewhere. And in the grasslands, where only *C. grahamii* has so far been found, it is absent.

" 6. The reactions are discussed on the parasitic combinations of *L. loa* and of *A. perstans*, and it is suggested that the fall in the incidence of the two infections, which occurs separately and at different rates both in the abrupt and in the more-gradual transition zones between the rain-forest and the mountain grasslands, may be due either to attenuation of the normal transmission mechanism, or to the replacement of that mechanism by another peculiar to the forest fringe, possibly involving a less-effective vector. Further information on these two possibilities is desirable."

Bertram, D. S. **A Nesting Method used for Prolonged Exposure of Cotton Rats to Superinfection with their Filarial Parasite, *Litomosoides carinii* (Travassos, 1919).** *Ann. Trop. Med. & Parasit.* 1953, Dec., v. 47, No. 4, 371–4, 2 figs. on pl. [11 refs.]

Strains of *Bdellonyssus bacoti*, the vector of *Litomosoides carinii*, are established in research institutes in many parts of the world, so that this mite has become recognized as a laboratory animal of some importance. Bertram reviews the literature concerning the different methods which have been employed to maintain the various strains, to infect them with the microfilariae of *L. carinii* and to transfer the resultant infective forms to the cotton rat. He then describes the special technique he used when exposing cotton rats to repeated infection or superinfection over prolonged periods. The ingenious technique (which is fully and precisely described in the paper) employed was a compromise between the need for maintaining reasonable cleanliness in the cage and at the same time interfering as little as possible with the mite population. *R. M. Gordon*

Ruiz Reyes, F. & Gonzalez Paredes, I. Nuevas adquisiciones epidemiológicas sobre oncocercosis en el Estado de Oaxaca. [**Recent Developments in the Epidemiology of Onchocerciasis in Oaxaca State**] *Bol. Epidemiológico.* Mexico. 1953, July–Sept., v. 17, No. 3, 77–80, 2 maps.

In 1951 onchocerciasis was known to exist in certain districts of Oaxaca, namely Choapan, Tuxtepec and Mixe, and in a limited zone, Playa Vicente, of the State of Veracruz. In June and July of 1952 in Cuicatlán, Oaxaca, in 7 villages upwards of 100 were found infected and in the last quarter of the same year, in Pochutla and Juquila, Simuliidae, especially *S. ochraceum*, were found in abundance and some persons were discovered to be infected; they had probably immigrated from other zones of the state where the infection was known to exist. In consequence of these discoveries the authors decided to investigate the extent of *Onchocerca* zones in the State of Oaxaca, especially the north-east and south-west.

In the "small focus" of Cuicatlán discovered to be infected in July 1952 and on the right bank of the Santo Domingo river, they found 7 villages [populations not stated] in which there were respectively 32, 6, 3, 3, 10, 24 and 16 infected persons, all with onchocerca nodules, some with serious ocular lesions, the disease being probably introduced from neighbouring foci only 2 days distant on horse-back. They were also suffering from amoebiasis, *Shigella* and *Salmonella* infections, malaria and goitre. It is estimated that this district became infected with *Onchocerca* some 5 years before this discovery. Treatment consisted of extirpation of nodules and administration of diethylcarbamazine [? dose]. In the districts of Juquila and Pochutla, centres of cultivation of coffee, with a moist climate and many streams, *S. ochraceum* abounds and several persons were discovered suffering from onchocerciasis, some of whom at least had immigrated from endemic zones in search of work. After a general cursory review the authors propose to return and study the whole population to determine more accurately the prevalence. Meanwhile patients will be treated and the movements of those with chronic onchocerciasis attempting to enter in search of work on the coffee estates will be controlled. The discovery in 1946 of a small focus of onchocerciasis in Venezuela, the gradual extending of the perimeter of this area and the discovery of foci in Cuicatlán and Pochutla show that the area of infection is gradually enlarging. *H. Harold Scott*

See also p. 743, Lewis, **Simuliidae in the Anglo-Egyptian Sudan.**

Colbourne, M. J. **The Treatment of Onchocerciasis with Small Doses of Antrypol.** *West African Med. J.* 1954, Mar., v. 3 (n.s.), No. 1, 46–7.

In 1952, Sarkies reported treatment of onchocerciasis in children in the Southern Gold Coast with doses of antrypol up to 170 mgm./kgm. spread over 8 weeks [this *Bulletin*, 1952, v. 49, 1066]. Because of unpleasant side effects which may be associated with antrypol, the present author studied the effects of a shorter course in the case of 34 schoolchildren harbouring *Onchocerca volvulus* embryos in skin smears. The children came from villages in the Northern Territories of the Gold Coast.

The children were divided into 2 groups: in the first, 20 mgm./kgm. antrypol were given intramuscularly and the same dose was given intravenously a week later; those in the second group received the first dose only. Single skin smears were taken at various intervals. The children were also grouped according to the presence or absence of nodules.

The results are shown in the table below:

	Under Observation for 4 months	Negative at end of 4 months	Under Observation for 15 months	Negative at end of 15 months
Two Doses				
With Nodules	9	3	6	2
Without Nodules	8	2	6	4
One Dose				
With Nodules	11	1	7	4
Without Nodules	6	4	5	2
Total	34	10	24	12

All children aged 7–18 years.

There were no controls, but in Sarkies's series no spontaneous recoveries took place in a control group after 13 months. No expert examination of the eyes was made. It is pointed out that as a single skin smear only was made at each examination the results were probably worse than the table indicates. Some children, negative after 4 months, were positive after 15.

It is evident that only about half the patients were cleared of microfilariae in the skin with the dosage used, whether it was single or repeated. These doses are clearly insufficient. The author adds that preliminary trials of the large doses used by Sarkies in the South are producing much less satisfactory results in the North. *H. J. O'D. Burke-Gaffney*

Hartz, P. H. **Histopathology of the Colon in Massive Trichocephaliasis of Children.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1953, Dec., v. 5, No. 4, 303–13, 9 figs. [25 refs.]

Although infection of children with *Trichuris trichiura* is extremely common, especially in the tropics, the question of its pathogenicity has never been satisfactorily settled. Recent clinical studies have drawn attention to the severity of symptoms, especially when the worm load is heavy. Generally speaking the symptoms evoked are diarrhoea with blood-streaked stools, recurring abdominal pains and tenesmus, sometimes loss of weight and repeated rectal prolapse. In none of the reported fatal cases quoted by the author was there a description of the histopathology, neither was any bacteriological examination made. Massive infection occurs in children who live in insanitary conditions and are exposed to infection with many kinds of parasites, and the majority are undernourished. In many, according to the author's experience, there exists extreme damage to the colonic mucosa due to amoebiasis or to infection with *Shigella* or *Balantidium coli*. Only those cases are suitable for microscopy in which the mucous membrane is fixed immediately after death and in which, apart from *Trichuris*, no important gross lesions are present in the colon.

Two fatal cases from Venezuela are described: one in a Mestizo girl of 8, the second in a Negro boy of 2. The first patient presented a common syndrome of severe anaemia caused probably by a combination of malnutrition and infection by *Necator*, complicated by massive trichuriasis and discrete amoebiasis. Death was caused by a pulmonary embolus, following thrombosis of the right femoral vein.

The second was a case of kwashiorkor complicated by amoebiasis, massive infection with *Trichuris* and terminal peritonitis. Only slight damage was caused by whipworms where they had penetrated into the mucous membrane of the colon. No inflammatory reaction was found in the zone immediately surrounding the parasites. In both some infiltration, mainly of plasma cells and lymphocytes, was found between the crypts of Lieberkühn. In the second case there were some numbers of eosinophiles, but where there were amoebae in the mucosa there was also intermingling with neutrophile leucocytes.

The sections were compared with those of a normal colon, but no significant differences were apparent. The upshot is that massive infection with *Trichuris* is confined to compression of normal structures where the worms have penetrated into the mucous membrane and nothing was found that could explain the severe clinical manifestations described. The probability is that the presence of the worms in the mucous membrane cause irritation of its nervous elements. The plexus mucosus is formed by a close network of innumerable fine fibres, isolated small multipolar ganglion cells, and

numerous interstitial cells, and it is supposed that irritation of these elements by numerous worms may seriously interfere with their coordinated function and may thus produce symptoms.

The conception of the worm as a cause of anaemia was formed at a time when no attention was paid to the important rôle which nutrition plays in the aetiology of many anaemias and other tropical conditions.

Concomitant conditions must therefore be eliminated before symptoms are attributed to the whipworm infection. *Philip Manson-Bahr*

DEFICIENCY DISEASES

Thomson, A. M. & Duncan, D. L. **The Diagnosis of Malnutrition in Man.** *Nutrition Abstracts & Reviews.* 1954, Jan., v. 24, No. 1, 1–18. [Numerous refs.]

"It is important that we should seek for means of determining when and how health is likely to be impaired by imperfect diet, or improved by better diet. The whole concept of physiological food requirements depends on accurate assessment of health in relation to diet." This review considers biochemical, clinical and somatometric methods of assessment. The interpretation of vital statistics in relation to diet is also discussed. Biochemical indices of nutritional status are fully reviewed and "their generally unhelpful nature is apparent". Clinical studies are considered valuable in the presence of signs of deficiency disease, but, short of these, specific criteria of malnutrition have not been discovered. A failure to grow is a measure of general ill-health in childhood. In normal development there is relatively greater growth in the leg than in the trunk. Thus the ratio of leg length (cristal height) to total height differentiates more sensitively than total height between children in different food expenditure groups. Improvements in growth of children and reduction in mortality rates can usually be attributed, as least in part, to concurrent improvement of national nutrition.

[This is a critical review, which maps out some of the false tracks up which many of the short cuts to nutritional assessment lead.]

R. Passmore

See also p. 707, Jelliffe, *Ascaris lumbricoides* **and Malnutrition in Tropical Children.**

Walker, A. R. P., Arvidsson, Ulla B. & Politzer, W. M. **The Significance of Low Serum Calcium Values in the South African Bantu.** *South African Med. J.* 1954, Jan. 16, v. 28, No. 3, 48–51. [48 refs.]

The serum calcium levels of Bantu children and adults have been determined and found to fall below levels reported for Americans and Europeans. In general the values are one-tenth lower than figures for corresponding white subjects. This lower level appears to be compatible with good health. There was no evidence of low concentrations of calcium in milk, increased proneness to fractures, reduced mineral content of bone or increased incidence of dental caries. The authors conclude that the lower levels reflect habituation to a low dietary intake of calcium: there is certainly no evidence of low levels of body mineral stores.

[This paper is valuable for its excellent bibliography. There appears now

to be an abundance of evidence that the human body is able to adapt itself over a long period to a diet much lower in calcium than that normally consumed in Europe and America.] *R. Passmore*

Rao, K. S., De, N. K. & Rao, D. S. **Investigation of an Outbreak of Night-Blindness in a Village near Madras.** *Indian J. Med. Res.* 1953, July, v. 41, No. 3, 349–57. [11 refs.]

An epidemic of night blindness in a village of 377 inhabitants in Madras reached such proportions that the Public Health Department were notified. A dietary investigation revealed that the diet of the village was very poor in all respects, but not more so than in a neighbouring village, in which night vision was normal. Indeed in this village the vitamin A value of the diet was only 430 IU per day, whereas in the affected village intake was higher. The prevalence of severe anaemia (Hb below 10 gm./100 cc.) was, however, more than twice as great in the infected village, and this was associated with a greater hookworm load. In the discussion, the authors point out that other factors in addition to low vitamin A intake may precipitate night blindness. The need for caution in assessing the significance of dark adaptation in undernourished populations is stressed. *R. Passmore*

Williams, R. R. **The World Beriberi Problem Today.** *J. Clin. Nutrition.* 1953, Nov.–Dec., v. 1, No. 7, 513–16.

This brief but informative paper gives a review of the position of beriberi today. There is the suggestion that in the East the disease is likely to spread with more mills and a greater industrial population. Beriberi can be prevented by the use of (1) undermilled rice, (2) parboiled rice, or (3) fortified rice. Each of these measures requires rigorous control and enforcement may run counter to popular taste. The apparently encouraging results of the introduction of fortified rice into parts of the Philippine Islands is briefly recorded [this *Bulletin*, 1951, v. 48, 494].

R. Passmore

Chhuttani, P. N. & Taylor, G. F. **Nutritional Peripheral Neuropathy related to " The Shoulder Girdle Syndrome " in Persia and Iraq Force 1944–45. Parts I & II.** *Indian Med. Gaz.* 1953, Oct. & Nov., v. 88, Nos. 10 & 11, 509–20; 563–70, 22 figs. on 11 pls. [20 refs.]

These 2 papers give a wealth of clinical details of 82 patients with neuropathy, seen during one year in a garrison population of about 18,000 Indian troops, most of whom had been 2 years away from India. The clinical picture was very variable and, as the papers show, caused difficulties in diagnosis, which visiting consultants did not always resolve. However, the authors establish a good case for the view that the varied signs and symptoms constituted a definite disease.

No evidence is presented to suggest that the diets of the men were in any way unsatisfactory. The principal evidence for a nutritional aetiology was that the condition was significantly commoner in vegetarians and also a claim for a statistically significant therapeutic response to thiamine. No infective, toxic or other cause of peripheral neuritis could be established. [Despite some statistical analysis of the effects of thiamine therapy, the claim for the beneficial value of the vitamin does not convince. Adequate controls are notoriously difficult to arrange. In the past, there have been many unsubstantiated claims for this vitamin in a variety of types of

neuritis. The disease had little in common with beriberi. However, these papers provide a full account of a difficult clinical and aetiological problem. Perhaps in the future, new knowledge of the chemistry of the nervous system may provide a solution.] *R. Passmore*

Gopalan, C., Venkatachalam, P. S. & Srikantia, S. G. **Body Composition in Nutritional Edema.** *Metabolism.* New York. 1953, July, v. 2, No. 4, 335–43. [11 refs.]

This paper records measurements of plasma volume, extracellular fluids (thiocyanate space) and total body water (urea space) on 15 emaciated beggars, each with severe famine oedema. In 5 of the cases, the determinations were repeated after the disappearance of the oedema. The absolute plasma volume of these men was low though the volumes were above normal when calculated as proportions of the total body solids. Extracellular fluid was greatly raised varying from 18·7 to 33·9 litres (37·8 to 59·0 per cent. of body weight). Intracellular fluid also appeared to be increased and in the table the water content of the cells is recorded as over 80 per cent. in several cases and as high as 91 per cent. in one. A normal figure of 67 per cent. is quoted. Intracellular oedema thus appears to be very marked. However, as the authors point out, the calculations depend on the reliability of the urea method for determining total body water. [This method, necessitating several physiological assumptions, has not yet become generally accepted. In the presence of such widespread disturbance of water balance, its reliability must be still more in question. Clearly a rise in water content of the cells in famine oedema is as yet only an interesting possibility requiring confirmation by other methods.] *R. Passmore*

Srikantia, S. G., Venkatachalam, P. S. & Gopalan, C. **Electrolyte Studies in Nutritional Edema.** *Metabolism.* New York. 1953, Nov., v. 2, No. 6, 521–8, 1 fig. [16 refs.]

The electrolyte content of the serum of destitute beggars with nutritional oedema was determined. The sodium content covered a range of 128–152 mEq./l., which extends both above and below the normal. Usually the value was a low normal. In 10 out of 12 cases, determinations carried out after disappearance of clinical oedema revealed a reduction in sodium concentrations. In the disappearance of the oedema, more sodium than water appeared to be lost. These results suggest that sodium retention was not the primary cause of the oedema. Chloride levels were low, 71 to 99 mEq./l., but rose slightly on disappearance of the oedema. Serum potassium levels were normal. There was no evidence that the renal response to variation in sodium chloride intake was impaired in nutritional oedema. *R. Passmore*

Venkatachalam, P. S., Srikantia, S. G. & Gopalan, C. **Basal Metabolism in Nutritional Edema.** *Metabolism.* New York. 1954, Mar., v. 3, No. 2, 138–41. [10 refs.]

"1. At the height of edema, cases of semistarvation had subnormal basal metabolic rate.

"2. There was an absolute rise in basal metabolism and a fall in body surface area after treatment resulting in an appreciable rise in basal metabolic rate per square meter per hour after treatment.

"3. The reduction in basal metabolism at the height of edema was almost entirely due to a reduction in the quantity of metabolizing tissue and not to any reduction in the oxygen consumption per unit of metabolizing tissue."

JELLIFFE, D. B. & WILLIAMS, L. L., with the technical assistance of E. F. P. JELLIFFE. **A Clinical Nutrition Survey in a Rural Jamaican Village (with Especial Reference to the Children).** *J. Trop. Med. & Hyg.* 1954, Feb., v. 57, No. 2, 27–40, 9 figs. & 1 chart. [19 refs.]

This paper reports a clinical survey of 90 families of mixed, but predominantly African, descent inhabiting a rural village in the foothills of the mountains of West Jamaica. Numerous stigmata of deficiency disease were found and systematically recorded on a nutritional appraisal chart. [This is a practical form, which others might profitably use.]

Babies below 9 months were for the most part healthy, plump and contented, with a glossy skin and normal hair. Between the ages of 1 and 3 years the well-covered baby was often replaced by a puny toddler with a palpable liver and depigmented, sparse, straight hair. This group appeared to be passing through a post-weaning phase of protein lack, which may be called latent kwashiorkor, although no manifest form of this disease was seen.

The older children, although thin, appeared strong with wiry muscles and mental alertness. Mosaic skin, permanent gooseflesh and dyspigmentation of the face were very common. General physique among the adults was better. Dental caries was very common. Neither intestinal nor blood parasites seemed to play an important part in exaggerating the nutritional abnormalities. *R. Passmore*

SRIRAMACHARI, S. & ANANTHACHARI, M. D. **Malnutrition and Cirrhosis. Study of Hepatic Structure and Function.** *Indian J. Med. Sci.* 1954, Jan., v. 8, No. 1, 31–40, 8 figs. on 2 pls. [40 refs.]

This paper records a study of liver structure (by biopsy) and function (by biochemical methods) of 88 persons with nutritional oedema and 45 persons with cirrhosis of the liver admitted into one of the medical units at the general hospital in Visakhapatnam. The histological changes were vacuolar degeneration and fatty infiltration of the liver cells in the early stages, leading up to mesenchymal reactions and severe fibrosis. There was no clear-cut distinction between the 2 groups and the observations are consistent with the view that liver degenerations following malnutrition lead to and constitute a common cause of cirrhosis. In malnutrition there was usually a grossly altered pattern of serum protein with low albumin levels. Fibrotic changes were always associated with raised total and gamma globulin levels. The cephalin cholesterol flocculation test and the thymol turbidity test are considered as useful aids both in diagnosis and prognosis of latent liver damage. [The reader will find this a very helpful paper for the study of methods of assessment of liver damage in the tropics.]

R. Passmore

BHENDE, Y. M. & DEORAS, S. M. **Pathology of Infantile Cirrhosis of the Liver.** *Indian J. Med. Sci.* 1954, Jan., v. 8, No. 1, 21–30, 7 figs. on 2 pls.

This paper describes the histological changes in the livers of 9 children aged 1 to 3 years, who died of cirrhosis. The normal architecture of the

lobules was lost. Necrosis of the liver cells was widespread and irregular. Fibrosis was diffuse and extensive. Small nodules of regenerating liver cells are shown in the figures regenerating in the fibrous tissue which consists of wide bands of collagen tissue. There was usually some proliferation of the small biliary ducts, but otherwise the biliary tree appeared normal and not primarily involved in the pathological process. The conclusion is reached that the cirrhosis is the result of repeated attacks of necrosis, involving the liver cells. No evidence is presented which would help to identify the nature of the toxic agent.

R. Passmore

Patwardhan, M. V., Ramalingaswamy, V., Sriramachari, S. & Patwardhan, V. N. **Nutritional Factors in Toxic Liver Injury. Part I. Biochemical and Histochemical Study of Liver Injury produced by Carbon Tetrachloride in Normal Rats.** *Indian J. Med. Sci.* 1953, Oct., v. 7, No. 10, 533–44, 16 figs. on 2 pls. [42 refs.] **Part II. The Effect of Methionine and Glutathione on Liver Injury produced by Carbon Tetrachloride.** *Ibid.*, 1954, Jan., v. 8, No. 1, 15–20, 5 figs. (4 on pl.).

These 2 papers are a comprehensive study of the histological, histochemical and biochemical changes in the liver that follow on a toxic dose of carbon tetrachloride. They are part of an attempt to elucidate the nature of hepatic necroses in general. The results are closely linked with studies of nutritional disorders of the liver. A feature of this investigation is that livers have been studied at regular intervals of time from 6 to 120 hours after rats had received the carbon tetrachloride. Histologically a characteristic feature was a reduction of the basophile staining of the cytoplasm in the cells in the centre of the lobules in sections stained with toluidine blue. This was evident after 6 hours. After 48 hours when regeneration was taking place the basophile staining was markedly increased.

There was a slight increase in the water content of the liver; total nitrogen fell from 3·5 gm. per cent. to 2·8 and glutathione from 204 mgm. per cent. to 89·5, but the values rose to normal during regeneration. The methionine content of the livers was not altered.

In a study of the liver enzymes it was shown that alkaline phosphatases rose to 5 times their normal value 6 hours after the toxic dose. Glutamic acid dehydrogenase rose and succinic acid dehydrogenase fell, but those changes were not great. Acid phosphatase and transaminase concentrations appeared to be not significantly changed.

In the second paper the effects of methionine and glutathione on these lesions were investigated. Methionine exerted no clear-cut effect on the prenecrotic and necrotic phases of the liver lesion, but appeared to accelerate regeneration. Methionine also suppressed the increase in alkaline phosphatase content of the liver after the injury. Glutathion had similar effects to methionine, but less marked.

[These 2 papers contain much information about the various different types of changes that occur in the necrotic liver. Unfortunately the authors have not yet been able to effect satisfactory correlation of their results. Toxic necrosis of the liver still remains a fascinating mystery.]

R. Passmore

De, N. K. **The Alleged Toxicity of Indian Pulses.** *Indian J. Med. Res.* 1953, July, v. 41, No. 3, 359–65.

In 1943 Pal and Bose reported [*Bulletin of Hygiene*, 1944, v. 19, 461] that diets containing 1 part pulse and 2 parts of rice when given to albino

rats caused a severe necrosis of the liver and kidneys. A toxic effect due to an imbalance of the amino-acid mixture was postulated. These experiments have been repeated and it was found that the deleterious effect of high-pulse diets was due to deficiency of calcium and phosphorus. When adequate mineral supplements were added to the diet, there was no evidence of any toxic effect of pulses, when they constituted one-third of the total food intake. *R. Passmore*

SPRUE

Ruffin, J. M., Carter, D. D., Johnston, D. H. & Baylin, G. J. **" Wheat-Free " Diet in the Treatment of Sprue.** *New England J. of Med.* 1954, Feb. 18, v. 250, No. 7, 281–2, 1 fig. [13 refs.]

Diet has always played a part in the treatment of the steatorrhoea of sprue as well as that of coeliac disease. [It is not clear whether the term " sprue " in this instance refers to what is known as idiopathic steatorrhoea or to tropical sprue.]

The patient discussed, a woman of 39, had suffered from diarrhoea, with weight loss, for 12 years. The illness began after a visit to South America and there was definite steatorrhoea and a flat oral glucose curve. Various diets, vitamins, folic acid, liver extract and calcium, were tried without improvement. There was no marked anaemia.

The jejunal X-ray pattern was strikingly abnormal, with segmentation and flocculation; the classical moulage sign was present.

The patient was then given a " wheat-free " diet with no medication, except calcium.

Within a few days she began to improve, and 2 weeks later she was better than in any previous remission.

When re-admitted, approximately 3 months after commencing the diet, she felt better than at any previous time since her illness had begun. She was then obese. Barium-meal studies showed that the jejunal and ileal patterns were entirely normal. Biochemically the greatest changes had been noted in the total protein and serum calcium, both of which reverted to normal: there was improvement in absorption of glucose and vitamin A.

It is suggested that improvement reported in the past in the dietetic treatment of sprue and coeliac disease may well have been due to the absence of wheat, since a factor in " banana " diet, " vegetable-fruit " diet and " starch-free " diet has been the elimination, or marked curtailment, of wheat. [A terminal footnote refers to 2 other cases in which the same result was obtained.]

[See also Frazer, this *Bulletin*, 1953, v. 50, 329.] *Philip Manson-Bahr*

HAEMATOLOGY

Holmes, E. G. **Examination of the Red-Blood Counts, Haemoglobin, Packed Cell Volume, Serum Iron and Iron Continuing Capacity of the Blood and Serum of a Small Series of Pregnant Women at Mulago Hospital.** *East African Med. J.* 1953, Oct., v. 30, No. 10, 427–9.

Venous blood was obtained from 45 women from the antenatal clinic of Mulago Hospital, Kampala, Uganda. In most of the samples were determined haemoglobin concentration, red cell count, packed red cell volume,

serum-iron concentration and serum-iron binding capacity. Sixteen of the women had to be considered anaemic, the haemoglobin being below 10 gm. per cent., even if a certain haemodilution due to the physiological expansion of the plasma volume in pregnancy was taken into account. As noted in other parts of the world so in these African women serum iron was lower and serum-iron binding capacity was higher, the more advanced the pregnancy. If this was an iron deficiency, it was not reflected in a fall of the mean corpuscular-haemoglobin concentration. *H. Lehmann*

Foy, H. & Kondi, Athena. **Treatment of Megaloblastic Anaemias. Relation of Penicillin to Vitamin B_{12}.** *Lancet.* 1953, Dec. 19, 1280–85, 6 figs. [14 refs.]

The authors divide Kenya Africans with megaloblastic anaemia into 3 types according to their response to treatment: (1) response to penicillin, to intramuscular and oral vitamin B12, to folic acid and to liver; (2) no response to penicillin or to vitamin B12 by mouth, but response to intramuscular vitamin B12 and to liver; (3) response to folic acid and crude liver only. No clinical and haematological difference between the 3 types of patients could be found. Of the 24 persons investigated 16 belonged to the first, 4 to the second and 4 to the third group.

Two patients each are chosen to demonstrate the different response-types in this article. The authors suggest that penicillin produces cures in the megaloblastic anaemia of Africans by causing ecological or physiological changes or both in the flora of the gut and the production of vitamin B12 in the intestines. Type 2 does not respond to penicillin or to oral vitamin B12 because there is a deficiency of intrinsic factor necessary for the absorption of vitamin B12, hence the response to intramuscular vitamin B12. Type 3 is not deficient in vitamin B12 but in folic acid. *H. Lehmann*

Choremis, C., Ikin, Elizabeth W., Lehmann, H., Mourant, A. E. & Zannos, Leda. **Sickle-Cell Trait and Blood-Groups in Greece.** *Lancet.* 1953, Oct. 31, 909–11, 2 figs. [21 refs.]

In 1952 Caminopetros [see this *Bulletin*, 1952, v. 49, 893] startled those interested in the sickle-cell haemoglobin problem with the news that in Athens almost 50 per cent. of the population were carriers of the gene conferring this abnormal haemoglobin. This called forth comments from Lehmann (*Lancet*, 1952, v. i, 1068) and Professor Choremis (ibid., 1069) who wondered whether Caminopetros had been seeing artefacts, particularly as his technique included a very prolonged incubation of his samples. In reply Caminopetros declared that as the incubation method had been good enough hitherto, he could see no need to repeat his work using another technique. It was therefore decided to repeat a survey of Greeks, most of them Athenians, and to use reducing agents which produce sickling in the appropriate bloods rapidly without involving a prolonged incubation. The first part of the article deals with true and false sickle cells, the latter cells being artefacts caused by external stresses such as drying of the plasma; there are 2 photographs reproduced, one showing true and one showing false sickling; false sickling is the phenomenon which was reported from Israel to have been seen in Yemenite Jews, false sickling is almost certainly the shape described as sickling in deer. One of the authors reports that tests on the Bakonjo and Kakwa tribes in Africa will have to be checked for inclusion of false sickling data, as at the time of

carrying them out, he had not yet been aware of this possible error. [Obviously in future no detailed discussion of cell shape will be able to compete with a simple electrophoretic test for the actual presence of the abnormal haemoglobin.] The result of the survey was that no sickle-cell trait carrier was found among 110 unselected Greeks, 50 of whom were born in Athens.

In addition to determining the sickle-cell haemoglobin incidence, a survey of blood groups was made. The most interesting feature was a high incidence of the otherwise rare Rhesus chromosome cD^{u}e. This seems to be a Mediterranean characteristic, since it has been found to an even greater degree in the Yemenite Jews (20·5 per cent.) [this *Bulletin*, 1953, v. 50, 144].

At the end of the paper a short report is given of an expedition to the Lake Kopais area of Greece, where a community of Greeks lives—an ethnological isolate—among whom the sickle-cell trait is found. *H. Lehmann*

Edington, G. M. **The Sickle-Cell Trait and Sickle-Cell Anaemia.** [Correspondence.] *Brit. Med. J.* 1954, Apr. 10, 871.

Allison [this *Bulletin*, 1954, v. 51, 526] reported a difference in the incidence of malaria in blood smears of Uganda children with or without sicklaemia. The author has carried out similar surveys in the Gold Coast. In 1949–50, 527 children were examined; 84 exhibited the trait and of them 30 (36 per cent.) showed malaria parasites in their smears. The other 443 children included 134 (30 per cent.) with parasitaemia. Recently another investigation was instituted. Of 161 children 32 were sicklaemic and of them 16 (50 per cent.) showed parasites; of the 129 non-sicklers 77 (60 per cent.) exhibited malaria in their blood. There was a great difference in malarial parasite density: it was 100 per cent. greater in the non-sicklers. [Allison thought he had some evidence for the sickling haemoglobin to protect more against malignant tertian than against benign tertian malaria; it would be of interest to know whether elsewhere a difference in parasitaemia as regards the type of malaria can also be found.]

One of the sickling children whose blood was originally negative for malaria became ill later on and the peripheral blood film showed a density of 29,000 parasites per cmm. In addition the author has seen malarial pigment in the reticulo-endothelial system of children who have died from sickle-cell anaemia. He suggests that the general trend of his figures is in agreement with those of Allison, although it cannot yet be said that the sickle-cell trait partially protects against malaria in the Gold Coast. *H. Lehmann*

Foy, H., Kondi, Athena, Timms, G. L., Brass, W. & Bushra, F. **The Variability of Sickle-Cell Rates in the Tribes of Kenya and the Southern Sudan.** *Brit. Med. J.* 1954, Feb. 6, 294–7. [12 refs.]

The purpose of the communication is to stress that while the sickling phenomenon is very widespread throughout Africa south of the Sahara, the most striking variations are found in its frequency and in that of the ABO blood groups. The authors examined 44 tribes and subtribes in Kenya and 26 in the Southern Sudan. Differences were found between groups of the same tribes living in different areas. The most likely explanation for this seems to the authors to be genetic drift. Small groups of people are living isolated and are marrying almost entirely within their own small group. Pure chance factors operating over a long period may cause gene frequencies to change greatly. If the population of such a small group then

increases the changed gene frequency will remain fairly stable unless intermarriage or other factors are introduced to upset it. While advising caution in drawing conclusions from the ethnological point of view from findings obtained in small communities the authors nevertheless feel that some of their results were of anthropological importance. Thus the Nilotes of Central Africa are divided according to sickling rates into 2 main groups, those of the Sudan (Dinka, Shilluk and Nuer) and those of Kenya and Uganda (Jaluo, Lango, Alur and Acholi), the former with very low sickling rates and the latter with medium to higher rates. The authors suggest that the Dinka, Nuer and Shilluk resemble more closely in this respect other tribes showing a low sickling rate, who speak Hamitic languages; the Masai, Galla, etc. *H. Lehmann*

Jelliffe, D. B., Stuart, K. L. & Wills, V. G., with the technical assistance of E. F. P. Jelliffe. **The Sickle Cell Trait in Jamaica.** *Blood.* 1954, Feb., v. 9, No. 2, 144–52, 1 fig. [70 refs.]

The main racial groups of Jamaica may be summarized as follows:— (1) predominantly African 78·1 per cent.; (2) other Afro-Caucasian or Afro-Asiatic mixtures 17·5 per cent.; (3) Caucasian 1·1 per cent.; (4) East Indian 2·1 per cent.; (5) Chinese 1 per cent.

The authors examined 2,116 blood slides from subjects in the different racial groups for sickle-cell trait using the vaseline-ringed coverslip technique with examination for sickling after 1, 2 and 3 days. The average Jamaican children had a sickle-cell trait incidence of 5·7 per cent. Two more isolated groups had incidences of 3·9 per cent. and 3·6 per cent. respectively. One of 152 East Indian schoolchildren showed the sickle-cell trait and none of 100 Chinese and 170 Caucasians.

The author proceeds to discuss the global distribution of the sickle-cell trait and a map of the world is produced in which it is shown how the sickle-cell trait originated in India, was carried by sea-borne migration to East Africa, from there across the continent to West Africa and from there again by sea-borne migration to Central America. [It is only fair to say that what the authors call the "migration" theory of Lehmann and Cutbush (this *Bulletin*, 1952, v. 49, 1152) does not postulate a sea-borne transfer of the sickle-cell trait from India to Africa. It is much more likely that both India and Africa—and possibly Greece—derived the sickle-cell trait in neolithic times from the Veddoids of Arabia where the sickle-cell trait can still be found in Veddian groups (Lehmann, this *Bulletin*, 1953, v. 50, 756).] *H. Lehmann*

Vandepitte, J. M. & Louis, L. A. **A New Method for the Differentiation of Sickle-Cell Anaemia from the Sickle-Cell Trait.** *Lancet.* 1953, Oct. 17, 806–10, 2 figs. [20 refs.]

The present means of differentiating between sickle-cell anaemia and anaemia in a sickle-cell trait carrier are reviewed and the conclusion is reached that the doctor in central Africa must, for the diagnosis of the idiopathic anaemia, rely on careful clinical observations and on 2 laboratory findings: irreversibly sickled cell in the stained films of peripheral blood and the appearance of long filamentous cell processes after 12 hours' incubation at 37°C. Unhappily the first sign is not always present and the second is negative in babies, and another drawback is that trait cells of patients with anaemia of other origin, particularly of the hypochromic type, may also tend to form numerous, though finer, appendages. Thus the authors

found themselves in difficulties with the very young babies and with patients who had recently received a blood transfusion.

A new method for the discovery of sickle-cell anaemia is suggested, based on the observation of the authors that myeloid tissue from sickle-cell anaemia patients showed an irregular entanglement of numerous rod-like structures of the same refraction, colour and transparency as the sickle cells. The individual elements varied from bits of a few microns to filaments as long as 50 μ. They were 1 to 3 μ wide and showed vacuolations and fusiform swellings. The examination of wet marrow films may help in the diagnosis of sickle-cell anaemia and it was indeed found to be useful in 44 cases so examined for sickle-cell anaemia at Léopoldville. There were only 2 failures of this new method, in 2 sickle-cell-anaemia patients who had received repeated transfusions. *H. Lehmann*

Beaven, G. H. & White, J. C. **Detection of Foetal and Sickle-Cell Haemoglobins in Human Anaemias.** [Correspondence.] *Nature.* 1953, Nov. 28, v. 172, 1006. [10 refs.]

The authors have examined blood from 175 normal and anaemic persons for the presence of foetal haemoglobin (F). Three methods were compared: spectrophotometric determination of the tryptophan fine structure band by the moving plate method, tracing of the tryptophan "slope", and a determination of the speed by which the haemoglobin was denatured at *p*H 12·8.

The first 2 methods are not reliable if the foetal component is less than 10 per cent. The third technique provides a sensitive means of detecting the more alkaline-resistant F and by measuring the increase of optical density at 640 mμ due to the formation of alkaline haematin, as little as 2 per cent. F can be detected by tailing of the main slope, and when more than 7 per cent. are present a good estimate of F can be made by extrapolation. It appeared that F was associated with infancy and after the first 4 months of life with the hereditary Mediterranean and sickle-cell disease as well as with allied disorders. In other hereditary haemolytic conditions, and in severe blood dyscrasias, even those with extra-medullary haemopoiesis, the haemoglobin was usually of the adult type.

H. Lehmann

Minnich, Virginia, Na-Nakorn, S., Chongchareonsuk, S. & Kochaseni, S. **Mediterranean Anemia.** A Study of Thirty-Two Cases in Thailand. *Blood.* 1954, Jan., v. 9, No. 1, 1–23, 5 figs. [77 refs.]

The authors studied 32 cases of Mediterranean anaemia in Thailand. Although nothing has been published, Mediterranean anaemia seems to have been recognized in Thailand for some 15 years. Thus in one year 46 cases were diagnosed in a total of 367 patients seen by the haematology service at Siriraj Hospital. In the present study the diagnosis was based on 5 criteria:— (1) clinical manifestations, splenomegaly, mongoloid facies; (2) the blood picture changes of hypochromia, anisocytosis, decreased osmotic fragility, raised serum bilirubin; (3) presence of alkali-resistant haemoglobin; (4) X-ray abnormalities; (5) family studies.

A search for sickle cells was also performed but none was found. It is of interest that of the 32 patients 3 were pure Chinese, 3 were partially Siamese—partially Chinese, and only 26 were pure Siamese.

The findings are given in detail. *H. Lehmann*

Frontali, G. Die Lebensdauer der roten Blutkörperchen bei der Mittelmeeranämie. [**The Life Span of Red Blood Corpuscles in Mediterranean Anaemia**] *Med. Klin.* 1954, Apr. 2, v. 49, No. 14, 509–11.

The 3 essential features of Mediterranean anaemia are: microcytosis, increased resistance of the red cells to hypotonic saline solutions and increased haemolysis. The author has related some of these observations to his finding of a shortened survival time of the red cell. Five children with thalassaemia major and minor were selected at the University Children's Hospital at Rome. Their blood group was O and when it was transfused into normal children with blood group A and B the life span was found to be 50–70 days in thalassaemia minor and 18–20 days in thalassaemia major. A similar study could be made by choosing children with 100 per cent. foetal haemoglobin; on transfusion into normal children who were free from foetal haemoglobin, the gradual disappearance of foetal haemoglobin could be followed, and the results agreed with those obtained by the transfusion of cells with different blood groups. Erythrocytes of normal relatives of thalassaemia patients had a normal life span of 110–130 days. [Although it is known that high foetal haemoglobin can be found in thalassaemia, this is the first time that as high a percentage as 100 has been mentioned.]

The bearing of increased blood destruction on the disease is discussed. Inability to use the iron of the destroyed cells for reproduction of blood causes haemosiderosis. The need for essential amino-acids for the continuous reproduction of globin exposes the patient to extra risk when he becomes malnourished. *H. Lehmann*

Ellis, J. T., Schulman, I. & Smith, C. H. **Generalized Siderosis with Fibrosis of Liver and Pancreas in Cooley's (Mediterranean) Anemia. With Observations on the Pathogenesis of the Siderosis and Fibrosis.** *Amer. J. Path.* 1954, Mar.–Apr., v. 30, No. 2, 287–309, 8 figs. on 5 pls. [29 refs.]

EPIDEMIC DROPSY

Chakravarty, N. K., Chakravarti, H. S., Dutta, B. N. & Chaudhuri, R. N. **Body-Fluid Changes in Epidemic Dropsy.** *Indian J. Med. Res.* 1953, July, v. 41, No. 3, 307–9, 3 figs.

Fluid changes were determined on 12 patients during an epidemic of dropsy in Calcutta in 1950, by estimation of plasma and blood volume and total thiocyanate space. During the acute phase, there was a considerable rise in thiocyanate space and plasma volume. The total blood volume rose slightly and there was a reduction in erythrocyte mass. The interstitial fluid volume returned to normal with the disappearance of oedema. The plasma volume fell and the erythrocyte volume increased on recovery, without much change in total blood volume. The authors consider that anaemia in epidemic dropsy is due to reduction in numbers of circulating cells rather than to haemodilution. *B. G. Maegraith*

VENOMS AND ANTIVENENES

Swaroop, S. & Grab, B. **Snakebite Mortality in the World.** *Bull. World Health Organization.* Geneva. 1954, v. 10, No. 1, 35–76, 1 fig. [12 refs.]

This paper contains details of the results of an enquiry into the extent of snakebite as a world health problem. Areas considered include Africa, the Americas, Asia, Europe, Oceania and Pacific. Allowing for the difficulty of obtaining reliable figures, the authors estimate that of a population of 1,122 million exposed to risk, 30,000 to 40,000 die from snake bite in the course of a year, out of a total of about half a million bitten. The mortality varies greatly from area to area; the highest is recorded in Asia, the next in South America. *B. G. Maegraith*

Lefrou, G. & Martignoles, J. Contribution à l'étude des propriétés du venin d'un vipéridé africain *Echis carinatus.* [**Properties of the Venom of the African Viper** *Echis carinatus*] *Ann. Inst. Pasteur.* 1954, Apr., v. 86, No. 4, 446–57.

Fatal cases of snake bite were recorded in 1951 in Togo caused by a reptile known locally as *adja* and identified as *Echis carinatus.* The authors have examined some of the physiological properties of the venom of African *E. carinatus.* The toxicity of *Echis* venom in respect of guineapigs, mice, rabbits and papio monkeys was compared with that of the venoms of *Aspis, Cerastes, Bitis* (*arietans* and *gabonica*) and found to correspond roughly with that of *Aspis.* Local changes at the site of inoculation of the venom were similar to those produced by other viper venoms, *viz.*, oedema, haemorrhage and necrosis. Pathological changes in the tissues were studied in guineapigs and monkeys. Congestion, oedema and sometimes pericapillary haemorrhages were found in the liver, lungs, kidneys, heart and brain; the spleen was congested and contained blood pigment; the suprarenals showed congestion, small haemorrhages and loss of lipoid material from the cortex. The poisonous properties of the venom were not affected by heating for half an hour at 65°C. but were lost after heating at 80°C. for the same time.

Echis venom possesses a high degree of coagulative power in human and cattle plasma. In the latter, the coagulative effect can be demonstrated in both citrated and oxalated material.

There is no haemolytic effect on human erythrocytes either at 37°C. or 0°C., whether activator (serum) is present or not. The venom has gelatinolytic and fibrinolytic (human blood) action. *B. G. Maegraith*

Efrati, P. & Reif, L. **Clinical and Pathological Observations on Sixty-Five Cases of Viper Bite in Israel.** *Amer. J. Trop. Med. & Hyg.* 1953, Nov., v. 2, No. 6, 1085–108, 8 figs. & 4 charts. [11 refs.]

This paper deals with clinical details of 65 cases of viper bite in Israel. The snake was identified in 33 cases and was presumed to be the same, *viz.*, *Vipera palestinae* in all.

The authors conclude that the venom is absorbed and spreads primarily by lymph channels. Pathological findings in 4 fatal cases are briefly described. The chief pathogenic process was damage to the small blood vessels. Details of the clinical features of cases are given in tables. The clinical picture was made up of local signs such as swelling, subcutaneous

haemorrhages, bloody and serous blistering, and of general signs, which were " manifested in the gastro-intestinal system by nausea, vomiting, abdominal pain and incessant diarrhea, in the cardio-vascular system by severe peripheral shock (drop in blood pressure . . . hemoconcentration) and by allergic signs ". The symptoms at onset were very similar to those of anaphylactoid shock; peripheral shock readily supervened. Severe anaemia commonly developed during the first week after biting and was followed by rapid spontaneous blood regeneration. Immediate transfusion did not prevent the development of the anaemia. " Evidence of haemolysis " was not found in any case until towards the end of the second week. There was in some cases, however, some relation between the increase in diameter of the bitten limb and the fall of haemoglobin concentration. The authors " give credit for a substantial part of the increase of thigh diameter to transudation of the blood ".

" Old " methods of treatment of snake bite are reviewed and generally discarded in favour of " new " techniques. First aid comprises the immobilization of a bitten limb in plaster " longettes " (in order to reduce the lymphatic absorption of the venom) and the injection of specific antivenene and of antihistaminics. All other local treatment is discarded. The patient is removed quickly to hospital where serum therapy is continued, antihistamine drugs are administered, and the limb kept at rest. The most important factor in treatment is combating shock by transfusion of blood, plasma or saline. The possible use of cortisone and ACTH is discussed.

B. G. Maegraith

Balozet, T. Le venin d'un scorpion saharien *Buthacus arenicola* (E.S.). [**The Venom of the Sahara Scorpion** *Buthacus arenicola*] *Arch. Inst. Pasteur d'Algérie.* 1953, Dec., v. 31, No. 4, 400–410, 1 fig. [19 refs.]

The paper contains an interesting account of the distribution and habits of the small scorpion *Buthacus arenicola*. Human accidents in Algeria are caused most commonly by *Androctonus australis*, which is said to be responsible for almost all fatalities. A footnote to this paper, however, describes a death caused by *B. arenicola*. The venom of *B. arenicola* is twice as toxic to mice as that of *A. australis*. It contains a powerful haemolytic factor which is active only in the presence of lecithin. A powerful but narrowly specific antitoxin is produced in horses. Antitoxic serum is effective against the homologous venom but not against that of *A. australis*. Antitoxin made from the latter is, however, active against the homologous venom and that of *B. arenicola*. *B. G. Maegraith*

Witkind, J. Nota sobre los arácnidos ponzoñosos del Uruguay, particularmente *Loxosceles laeta*. [**The Venomous Spiders of Uruguay; in particular** *Loxosceles laeta*] *An. Facul. de Med. Montevideo.* 1953, Sept.–Oct., v. 38, Nos. 9/10, 351–8, 13 figs. [13 refs.] English summary (3 lines).

According to the author spider-bites in Uruguay may be divided into 4 clinical types: (1) neurotoxic, as by *Latrodectus mactans* and *Ctenus*; (2) with cutaneous gangrene but relatively little systemic disturbance, as by *Lycosa* sp.; (3) cutaneous gangrene with haemolytic jaundice, as by *Loxosceles laeta*, which may cause merely the cutaneous gangrene as in type 2; or (4) a scarlatina-like eruption. There may be added a fifth group giving rise to a cutaneous gangrene and neurotoxic symptoms, members of the family *Theraphosidae*. In Uruguay 4 families are found: *Theridiidae* to

which *Latrodectus mactans* belongs; *Lycosidae*; *Ctenidae* which are not indigenous to Uruguay but are imported from Brazil, and *Sicariidae* to which *Loxosceles* belongs, and also *Scytodes*, but the latter is not met with in Uruguay.

Each of these is described; *Loxosceles laeta* lives in closest proximity to man, in old or modern dwellings, lurking behind clothes hung against walls, in books and behind pictures. A snare of horsehair forming a loop with the ends passing through a Pasteur pipette for catching specimens is described and illustrated. *H. Harold Scott*

Mackinnon, J. E. & Witkind, J. Recherches sur l'action pathogène et sur la spécificité du venin de l'araignée *Loxosceles laeta* (Nicolet). [**On the Pathogenicity and the Specificity of the Venom of** *Loxosceles laeta*] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 101–4.

The effects of bites by *Loxosceles laeta* in laboratory animals—mice, guineapigs and rabbits—and in man have been described on several occasions in this *Bulletin* [see 1948, v. 45, 109, 641; 1949, v. 46, 1076; 1954, v. 51, 102 (and above, p. 725)]. For the present series of experiments the authors caught the spiders in modern homes in Montevideo by means of the snare described by Witkind in the above abstract. Of 57 mice bitten by this spider 42 died in 8 to 48 hours; the survivors were again subjected to the bite and they too died; it is thought that " the first bite had been incomplete ". The symptoms were similar in all—early prostration, abdominal type of respiration, then apnoea and death after convulsions. The local lesion (the bite was on the ears) comprised oedema, haemorrhage and, if the animal survived long enough, necrosis. These have been described more than once in this *Bulletin* and need not be repeated. The authors next titrated the venom by placing a pair of glands of a female *L. laeta* in 0·5 cc. distilled water with added 1 : 10,000 merthiolate for preservation. The MLD of this for mice was 0·15–0·3 cc. From glands weighing 0·13 to 0·24 gm. the weight of dried venom varied between 0·3 and 0·8 mgm. A rabbit injected with 0·5 cc. of the aqueous extract at the back of the thorax showed swelling with ecchymosis and a scar of 2 cm. diameter; the lesion extended anteriorly to the midline of the abdomen and down to the pubis with a necrosis of 1·5 cm. diameter. Strange to say, the glands of male specimens proved non-toxic and bites by them were not followed by signs of poisoning.

An antivenene prepared in mice and in rabbits proved very effectual, whereas anti-*Lycosis*, anti-*Phoneutria*, anti-*Latrodectus* and anti-*Crotalus* sera did not, and the conclusion follows that the venom of *Loxosceles laeta* is specific. *H. Harold Scott*

Bettini, S., Ravaioli, L. & Cantore, G. Nota preliminare sulla preparazione di un siero immune specifico verso il veleno di *Latrodectus 13-guttatus* Rossi. [**Preliminary Note on the Preparation of an Immunization Serum which is a Specific against the Poison of the** *Latrodectus 13-guttatus* **Rossi (Black Widow Spider)**] *Rendiconti Istituto Superiore di Sanità*. Rome. 1954, v. 17, Pt. 3, 192–9. English summary (6 lines).

Poisoning from *Latrodectus* bites is far from infrequent in Italy. During 1949–51 there were 262 cases reported. Specific serum has been prepared against *L. mactans*, but not against the venom of *L. 13-guttatus*. Good results have recently been obtained from intravenous injection of calcium gluconate, but this is, of course, not specific. The authors have set about

preparing a specific antivenene. They removed the poison glands, ground them in a mortar with glycerin and normal saline and then kept the product at 4°C. *in vacuo* for a month, an interval which does not reduce their toxicity. A pair of dried glands weighs 0·0–0·16 mgm. Inoculation of this into mice in a proportion of 0·9 mgm./kgm. produces excitement, jumping about, muscular tremors, fleeing in all directions, incoordination, convulsions and death in about 10 minutes. Others present excitation followed by depression with marked dyspnoea, immobility and death in 4–5 hours. At autopsy, the organs are congested and even haemorrhagic, markedly in the brain, and the bladder is full of blood-tinged urine. Guineapigs with a dose of 0·075 mgm./kgm. show an initial excitation, then, after an interval during which the animal seems to return to normal, dyspnoea sets in with paralysis of the limbs ending in death [time not stated]. *Post mortem* there is general congestion of viscera, oedema of lungs, retention of urine and enlargement of liver and spleen.

For production of antiserum rabbits are used, the doses of venom injected being 0·03 [stated as 0·3, an obvious error], 0·09, 0·175, 0·35, 0·585 mgm. at 6-day intervals, a total of 1·230 mgm. A second serum was obtained after inoculation, at 5-day intervals, of 0·130, 0·260, 0·525, 0·790, 1·585, 1·900, 1·900, 2·000, 2·000 and 2·300, a total of 13·390 mgm. of the dried glands. The antiserum was tried on guineapigs, animals very susceptible to the venom of *L. 13-guttatus*. Their weight was from 220 to 330 gm., and the dose of venom injected was 0·2 mgm./kgm. and of the antivenene 2 cc. were injected subcutaneously. Observations were kept up for 72 hours. All of 13 given the antivenene survived, all but one of the controls given normal serum died. This is sufficiently encouraging to warrant trial in human cases of *L. 13-guttatus* poisoning. *H. Harold Scott*

TOXOPLASMOSIS

Hedqvist, T. **Toxoplasma Infection at Different Ages, studied by the Skin-Test Method.** *J. Hygiene.* 1953, Dec., v. 51, No. 4, 478–82.

The author has used Frenkel's skin test for a survey of the incidence of human toxoplasmosis in different age-groups of Sweden. In this test 0·1 cc. of toxoplasmin—prepared from *Toxoplasma* cultures on chick embryos—is injected intracutaneously, while a control reagent (extract of normal chick embryo) is injected into another part of the skin. The reaction was read after 48–72 hours, when redness and infiltration over an area from 10 × 10 mm. was regarded as positive.

An investigation of 648 persons, aged from 0 to 45 years, in a town of Central Sweden, revealed 1 positive reaction among 379 children under the age of 15, while in the older age groups the proportion of persons reacting positively rose rapidly to 40 per cent. between the ages of 30 and 45. On the other hand, figures for adults in North Sweden were only up to 10 per cent. *C. A. Hoare*

Manwell, R. D. & Drobeck, H. P. **The Behaviour of *Toxoplasma* with Notes on its Taxonomic Status.** *J. Parasitology.* 1953, Dec., v. 39, No. 6, 577–84, 1 fig. [23 refs.]

Though in recent years toxoplasmosis has come to occupy an important place among the protozoal diseases of man and animals, our knowledge of

the systematic position and structure of *Toxoplasma gondii* is still incomplete. The present work was undertaken with the view to elucidating some of the obscure points in the biology of this parasite, which was studied at room temperature or on a warm (37°C.) stage in fresh preparations of the peritoneal exudate of mice infected with a human strain, as well as in slides stained by Leifson's method, used for the demonstration of flagella.

When free, the toxoplasms are crescentic in shape, with one end blunt and the other pointed, measuring 6–10 × 3–4 μ; in tissue sections the intracellular forms appear to be rounded. The parasites are moderately mobile: they may somersault, rotate on the long axis, progress spirally at the rate of about 10 μ per minute, bore themselves into leucocytes, or twist when inside the host cell. The authors failed to find any evidence of the presence of flagella in these organisms, or of a life-cycle, apart from the well-known binary fission and agglomeration in pseudocysts.

As regards the affinities of *Toxoplasma*, it has the greatest similarity to *Sarcocystis*, as shown in a table in which the differential characters of the two genera are given side-by-side. It is concluded " that neither fits well into the scheme of protozoan classification ", but their true nature remains uncertain. *C. A. Hoare*

Behrens, M. & Geissler, H. Reingewinnung von Toxoplasmen. [**Method for Obtaining Cell-free Toxoplasms**] *Ztschr. f. Hyg. u. Infektionskr.* 1954, v. 138, No. 5, 508–12, 2 figs.

The complement-fixation reaction used for the diagnosis of toxoplasmosis is handicapped by the absence of a reliable method for the preparation of a specific antigen from the parasites freed from extraneous cells. The authors describe in detail a method for obtaining " pure " toxoplasms from the peritoneal exudate of infected mice. The procedure is briefly as follows: the morphological constituents of the exudate are separated from the fluid by centrifugation, after which they are washed in saline and re-centrifuged; the resulting material is treated with acetone, after which it is transferred to neutral organic fluids, such as petroleum ether and carbon tetrachloride, in which the constituent cells are suspended. Finally, the larger and heavier host-cells are separated from the smaller and lighter parasites by centrifugation, at a speed which throws down the cells, while leaving the toxoplasms in suspension, from which they are pipetted off. *C. A. Hoare*

Drobeck, H. P., Manwell, R. D., Bernstein, E. & Dillon, R. D. **Further Studies of Toxoplasmosis in Birds.** *Amer. J. Hyg.* 1953, Nov., v. 58, No. 3, 329–39, 2 figs. [12 refs.]

Although infection with *Toxoplasma* has been reported from numerous species of birds, the authors believe that in the majority of cases the parasite is distinct from that causing mammalian toxoplasmosis. Only infections in some pigeons, canaries and penguins could be attributed to *T. gondii*, while a number of avian species were found to be susceptible to experimental infection with this parasite. In order to throw further light on bird toxoplasmosis [in addition to observations reported previously: this *Bulletin*, 1952, v. 49, 725], the authors (a) examined sparrows (*Passer domesticus*), purple grackles (*Quiscalus q. quiscala*) and pigeons (*Columba livia*) for natural infections by means of the dye test or by inoculation of emulsions of the tissues of suspected cases into mice or both, and (b) made observations on experimental infections of sparrows, pigeons and turkeys

with toxoplasms from infected mice. Out of a total of 265 wild birds, only one pigeon proved to be naturally infected with *Toxoplasma*, but since pigeons are susceptible to experimental infection, they can be regarded as potential reservoir hosts of toxoplasmosis. In these birds the infection may last from 35 days to a year or longer, terminating in recovery or in death. The infection is characterized by a high antibody level (dye test), producing immunity to re-infection. Attempts to detect infection in young pigeons fed by infected parents produced negative results. It was shown that turkeys were also highly susceptible to experimental toxoplasmosis in the first weeks of life. The course of the infection in these birds is similar to that in pigeons, being in most cases chronic, with parasites persisting in the organs (especially the brain) up to 2 months. *C. A. Hoare*

Jacobs, L., Melton, Marjorie L. & Cook, M. Katherine. **Experimental Toxoplasmosis in Pigeons.** *Exper. Parasit.* New York. 1953, Oct., v. 2, No. 4, 403–16.

Since pigeons are naturally infected with *Toxoplasma gondii* and are susceptible to experimental infection, it is thought that they might serve as reservoir hosts of human toxoplasmosis. In order to throw further light on the rôle of these birds in the epidemiology of this disease, the authors have carried out investigations on pigeons infected by different routes with 3 strains of *Toxoplasma* varying in virulence. The virulent strain RH killed 45 per cent. of the birds, producing high parasitaemia lasting about a fortnight or till death. In the case of the less virulent strains parasitaemia was correspondingly lower. Serological observations made with the dye test on some of the infected birds indicate a fairly rapid drop in the antibody titre, which may be undetectable less than 1½ years after inoculation, while parasitaemia disappears by the time the titre reaches a maximum. However, the toxoplasms persist in the brain of infected birds in the form of pseudocysts for periods up to 33 months, without producing antibodies.

Though the present experiments do not fully support the view that pigeon toxoplasmosis is transmissible by blood-sucking arthropods, this possibility cannot be excluded without more extensive data. *C. A. Hoare*

Sergent, Ed. & Poncet, Alice. Longue durée d'une infection latente à toxoplasmes chez un canari. [**Long Duration of Latent Toxoplasmic Infection in Canary**] *C.R. Soc. Biol.* 1953, Nov., v. 147, Nos. 21/22, 1773–4.

The authors record the case of a canary which was kept in Algiers in a cage protected from insects by mosquito-netting for 6 years, in the course of which it was used for experimental infections with *Plasmodium relictum*. During this period no other parasites were detected in its blood, but after its death (Oct. 1953) a heavy infection with *Toxoplasma* was revealed in various organs and tissues. Among more than 6,000 canaries examined during 15 years, this was the first case of toxoplasmosis observed. After discussing various possible sources of infection, it is concluded that the infection in the present case might have lasted over 6 years if the bird had acquired it before captivity, or between 2½ and 6 years if toxoplasms were inoculated with the blood of birds which on 3 occasions served as donors of the malaria infection. *C. A. Hoare*

DERMATOLOGY AND FUNGUS DISEASES

Moore, M. **Mycetoma of the Hand and Arm caused by** *Madurella*. Report of a Case with a Review of the Literature. *Amer. J. Trop. Med. & Hyg.* 1954, Mar., v. 3, No. 2, 303–25, 6 figs. [54 refs.]

Hill, B. H. R., Cook, L. G. & Saxby, C. **Chromoblastomycosis (Dermatitis Verrucosa): Report of a Case.** *Australian J. Dermat.* 1953, Dec., v. 2, No. 2, 80–82.

Mackinnon, J. E., Artagaveytia-Allende, R. C. & Arroyo, L. Sobre la especifidad de la intradermorreacción con paracoccidioidina. [**On the Specificity of the Intradermal Reaction with Paracoccidioidin**] *An. Facul. de Med. Montevideo.* 1953, Sept.–Oct., v. 38, Nos. 9/10, 363–82. [19 refs.] English summary.

In view of the proved value of the specific dermal sensitivity test in the epidemiological study of coccidioidomycosis and histoplasmosis, its application to a similar study of South American blastomycosis seems feasible although the existence of very mild or subclinical infections by *Paracoccidioides brasiliensis* has not yet been clearly established. Limited studies on dermal sensitivity to paracoccidioidin have already been made by Lacaz; de Carvalho; and Friedman and Conant [this *Bulletin*, 1951, v. 48, 1144; 1953, v. 50, 1076; 1954, v. 51, 639].

The object of the present work is the evaluation of the paracoccidioidin reaction as a specific test, applicable to epidemiological surveys. The paracoccidioidin used was a sterile filtrate of 45-day-old cultures of *P. brasiliensis* in glucose broth containing thiamine. Preliminary tests were made with filtrates of cultures of the yeast form of the fungus incubated at 37°C. and of the mycelial form incubated at 25° to 30°C. The former was effective, at a dilution of 1 : 10, on 18 out of 19 sensitized guineapigs, and at 1 : 100 on 14 out of 19 animals, but the filtrate of mycelial cultures was very feeble in this respect. The guineapigs used in this work were sensitized by infection, through intratesticular inoculation, with *P. brasiliensis* and tested for dermal sensitivity to paracoccidioidin from 1 to 3 months later.

Tests for cross sensitivity showed that out of 19 guineapigs sensitized to paracoccidioidin, 3 reacted also to histoplasmin at a dilution of 1 : 10, and 1 at 1 : 100, but none reacted to coccidioidin or tuberculin. Of animals sensitized to coccidioidin, 8 out of 31 reacted to paracoccidioidin at 1 : 10; of 19 sensitized to histoplasmin 2 reacted also to paracoccidioidin at 1 : 10; of 18 sensitized to sporotrichin 1 reacted to paracoccidioidin at 1 : 10, but none of 15 sensitized to tuberculin reacted with paracoccidioidin. When paracoccidioidin was used at a dilution of 1 : 100 none of the cross reactions mentioned above occurred. Tests with paracoccidioidin at 1 : 10 on 4 men highly sensitive to sporotrichin and 1 sensitive to histoplasmin showed no cross reaction, nor was a cross reaction shown when tests were made with coccidioidin, histoplasmin and sporotrichin on these 5 subjects. In a case of South American blastomycosis reacting to paracoccidioidin at 1 : 100 there was no cross sensitivity to histoplasmin or coccidioidin at 1 : 10. Paracoccidioidin can therefore be used for a relatively specific test in epidemiological studies at a dilution of 1 : 100, but control tests with histoplasmin should also be made; a control coccidioidin test need not be used outside the endemic areas of coccidioidomycosis.

Out of 537 persons tested in various part of Uruguay, 58 (10·8 per cent.) reacted to histoplasmin and 11 (2 per cent.) to paracoccidioidin; of these 11,

9 reacted also to histoplasmin but the remaining 2 reacted only with paracoccidioidin and at a dilution of 1 : 100. These 2 are presumed to have been benign or subclinical and unrecognized cases of South American blastomycosis. Up to the present time, only 7 cases of the disease have been identified in Uruguay and it seems to be associated topographically with uncultivated, richly wooded areas in the basins of large rivers.

J. T. Duncan

Potenza, L., Lares Campos, C. & Feo, M. Paracoccidioidosis infantil en Venezuela. Aspecto del parásito a la luz polarizada. [**Infantile Paracoccidioidosis in Venezuela. Appearance of the Parasite by Polarized Light**] *Archivos Venezolanos Puericult. y Pediat.* 1953, Jan.–Mar., v. 16, No. 47, 7–17, 11 figs. on 4 pls. [25 refs.] English summary.

Clinically manifested blastomycosis of the South American type (*Paracoccidioides brasiliensis*) is rare in children under the age of 10; the disease is found most frequently in adults in the 3rd to 5th decades of life.

The present report deals with a case in a girl aged 9. The disease was predominantly of the glandular type, involving, in order, the occipital, cervical, axillary and inguinal groups of lymph nodes, and the tonsils. There was an irregularly-shaped mass, hard and painful on palpation, in the central abdomen, but the heart, lungs, liver and spleen appeared to be normal; radiography of the chest and abdomen revealed nothing noteworthy, and the Mantoux test gave a negative result. The child was undernourished, anaemic and febrile and a provisional diagnosis of Hodgkin's disease was made. Biopsy of a cervical lymph node, however, led to the diagnosis of blastomycosis, by microscopy and by cultivation of *P. brasiliensis*.

Treatment was commenced with large doses of sodium sulphadiazine by mouth and parenterally and afterwards by mouth alone. The total dosage over a period of 2½ months was 434 gm. of which 419 gm. had been given by mouth and 15 gm. parenterally. Blood levels of 18·8 mgm. and 16·3 mgm. per cent. were reached in the earlier stages of treatment, but 4·5 mgm. per cent. was considered a sufficient level in the later stages. At one time, treatment was interrupted for 5 days because of vomiting and haematuria.

The treatment brought about recession of the glandular enlargements and a general clinical improvement, but the child died some time later in a sanatorium and an autopsy revealed generalized disease.

P. brasiliensis was isolated in culture from the lesions, on glucose agar, the yeast-like form developing in 8 days at 37°C. and the mycelial form in 15 days at room temperature. For the histological study, of which a further report is to be made, stained sections were used, including some impregnated with silver, but the parasite could be demonstrated in unstained sections by the use of polarized light and a brief account is given of its appearance under these conditions.

J. T. Duncan

TROPICAL OPHTHALMOLOGY

Bull. Ophthalm. Soc. Egypt. 1952, v. 45, **Session 49,** pp. xxxvi + 288, numerous figs. [Numerous refs.]

This volume comprises the proceedings of the 49th Session of the Ophthalmological Society of Egypt, held in March 1952. Much of it is

concerned with Society affairs, but there are some 280 pages devoted to scientific communications. This part is divided into 14 sections, comprising between them 42 papers. Most of the papers are concerned with general ophthalmology, but the following points will be of special interest to ophthalmologists in the tropics.

Professor Gohar deals with antibiotics, with special reference to their use in ophthalmology. His paper concludes with 4 useful tables showing respectively, the sources of antibiotics, the common organisms which may infect the eye, their sensitivity to 5 common antibiotics, and the routes of administration used and the concentrations obtained in the blood and the eye.

Professor Abd-el-Hamid Attiah discusses the use of antibiotics in extra-ocular infections, which he classifies and discusses individually.

Dr. Kamel reviews the place of antibiotics in the treatment of trachoma. He sets out the basis of treatment, both mass and individual, which he considers is indicated in the light of present knowledge.

Professor Mitsui describes the clinical course and diagnosis of trachoma, assessment of chemotherapeutic efficiency, follow-up, and some complications.

Drs. Maxwell Lyons and Gamal Edding Abdine describe and illustrate graphically studies on the effect of fly control on the epidemic spread of acute ophthalmia. The incidence of acute gonococcal and Koch-Weeks infections was greatly reduced in villages where fly control was adopted, compared with neighbouring villages where it was not.

Dr. Kamel proposes and sets out a new classification for trachoma, which he divides into 3 stages. He puts forward what he believes to be the advantages of this classification and presents it for discussion.

H. J. O'D. Burke-Gaffney

Bull. Ophthalm. Soc. Egypt. 1953, v. 46, Pts. 1 & 2, pp. xxxvi + 399; xxiii + 401–699, numerous figs. [Numerous refs.] **Golden Jubilee, Session 50.**

These 2 volumes comprise the proceedings of the 50th session of the Ophthalmological Society of Egypt, held in February 1953. The first volume consists of 14 scientific sections and contains 50 papers. The following are of special interest to readers of this *Bulletin*. Professor Pasheff discusses hyalinization of true trachoma. The histopathogenesis of trachoma is discussed by Dr. Badir and also by the same author with Drs. Wilson and Maxwell Lyons: in the latter case, the contribution consists of 64 photomicrographs with annotations. Dr. Radovanovitch gives an account of trachoma and measures of control in Serbia. Between 1948 and 1951, 3·07 per cent. of over 1½ million people examined in surveys were found to be infected. Ten special dispensaries and 180 stations were established, and from that time over 11,000 persons have been practically cured.

Dr. Maxwell Lyons describes the control of trachoma and acute seasonal conjunctivitis in Egypt and North Africa and draws attention to their close epidemiological relationship. The difficulties in mass control are discussed.

Dr. Refatullah writes briefly on the incidence of trachoma in East Pakistan. The incidence is low but has increased somewhat since 1947.

Dr. Mohyi el Din Said describes the use of oxytetracycline ointment in 43 cases of trachoma in schoolchildren: he found the result very encouraging.

Dr. Stany Habachy surveys the social aspects of the control of trachoma in Egypt and makes suggestions for methods of approach.

Dr. Dusan Dobrovic refers to the significance of ascarid infections of the eye and gives illustrations from his own experience.

H. J. O'D. Burke-Gaffney

Kirisawa, N. **Research on Trachoma. Especially on Fixed Virus of Trachoma.** *Rev. Internat. du Trachome.* 1954, v. 31, No. 1, 60–74.

An account of the organization and research programme of the trachoma research team of the University of Tokyo. [The programme is comprehensive, but insufficient experimental detail is given for critical appraisal. Much seems to depend on the nature of a so-called " fixed virus " obtained by serial intracerebral passage in mice; a technique which has its pitfalls.]

E. T. C. Spooner

HEAT STROKE AND ALLIED CONDITIONS

Horne, G. O. **Sensitivity to Atropine in Anhidrotic Heat Exhaustion.** *Trans. Roy. Soc. Trop. Med. Hyg.* 1954, Mar., v. 48, No. 2, 153–5.

A subject who had had anhidrotic heat exhaustion a year previously was given 1/100 grain atropine during an operation for acute appendicitis. His temperature rose during the operation to 103°F., with dry skin. It was thought that the pyrexia might have resulted from impaired sweating due to abnormal reactivity to atropine. Tests were carried out under control conditions on 10 subjects (4 normal; 3 with a history of anhidrotic heat exhaustion during the same year; 3 with a history of anhidrotic heat exhaustion during the previous year), who performed a standard exercise at 88°F. (dry bulb) and 83°F. (wet bulb). Sweat was collected from the arm in an oiled-silk envelope. It was found that injection of 1/100 grain atropine caused bigger proportional reductions in sweat volume in subjects who had had anhidrotic heat exhaustion. No consistent changes in sweat salt content were noted.

The author points out that a history of anhidrotic heat exhaustion should lead to caution in the use of atropine in a hot climate. *B. G. Maegraith*

MISCELLANEOUS DISEASES

Guilbride, P. D. L. **Veterinary Public Health. The Importance of Animal Disease to Public Health in the Caribbean with special reference to Jamaica. Part VI. Milk-Borne Diseases. Other Zoonoses. General Summary. Additions.** *West Indian Med. J.* 1953, Dec., v. 2, No. 4, 259–68. [19 refs.]

Denoix, P. F. & Laurent, C. Présentation des cas de cancer chez le Noir enregistrés en Afrique Occidentale Française pendant l'année 1952. (Par les soins des médecins du Service de Santé de la France d'Outre-Mer.) [**Tabulation of Cases of Cancer in Africans Registered in French West Africa in 1952**] *Bull. Inst. Nat. Hyg.* Paris. 1954, Jan.–Mar., v. 9, No. 1, 78–81.

The authors present in 3 tables a classification of cases of cancer in Africans registered by the Medical Corps of French West Africa, refraining

from any calculations of frequency or commentary, except to say that they prove that cancer exists among Africans and that primary cancer of the liver is the most frequent form.

Table I gives the numbers registered in different geographical areas. Of a total of 367, 239 were males and 128 were females and 221 were histologically verified; Dakar Central Hospital heads the list with 138 cases and Senegal (without Dakar) follows with 80. Table II gives the sex and anatomical site of the disease in all the patients; cancer of the liver accounts for 64 per cent. of the cases in males and 16 per cent. of those in females; among the latter cancer of the breast forms 22 per cent., cervix uteri 12 per cent. and carcinoma of skin (excluding malignant melanoma) 12·5 per cent. Table III gives the ages of all the patients. The maximum incidence in males was in the fourth decade at 30–34 years of age and in females in the fifth decade at 40–44 years. The authors add that as no information is available on the age distribution of the population, no conclusions can be drawn. *W. L. Harnett*

Higginson, J. **A Rational Approach to Cancer Surveys in the Bantu.** Reprinted from *Leech.* [? 1952], v. 22, No. 2, 4 pp., 4 figs. [10 refs.]

Vital statistics are not available among primitive people, yet it is by comparative surveys between these and more civilized peoples that we are most likely to discover some of the carcinogenic properties of our civilization. For these reasons an accurate survey of malignant disease in the Bantu would be valuable and where he comes into contact with modern hospital facilities certain figures become available. In South Africa we have a unique opportunity in that we may study the distribution of cancer in 4 races—European, Bantu, Eurafrican and Indian—living under similar climatic conditions, but with very different dietetic and social habits.

Comparisons in Surveys: When vital statistics are presented purporting to be an estimate of the incidence of a particular disease among different populations, it must be decided whether the figures in each survey are comparable. In cancer study, for example, comparisons of the patient populations of hospitals may be invalid because in one a high proportion of male admissions are caused by trauma.

Importance of Age Grouping: In the Baragwanath Hospital in Johannesburg only 17 per cent. of patients admitted, excluding children, are over 45 years of age, compared with 47 per cent. at the General Hospital, yet it is in the former group that the greater number of cancer cases is seen. This does not mean that the people at the first hospital are more susceptible. In a Bantu population there is a marked drop in the number of people in the fifth decade; also relatively few of those in the older age groups are admitted to hospital, so the hospital will have a disproportionately small number of patients in the " cancer age " group.

Morbidity and Mortality Rates: It is most important to distinguish these apart, as the latter may give an erroneous impression of the frequency of certain tumours. For example, a case of mammary or cervical cancer seen early and treated satisfactorily will not appear as such in the mortality rate, but if seen at a later stage with generalized secondaries would appear. Hence the necessity of registering every case of cancer.

Diagnosis: Registration of cancer cases diagnosed by clinical methods alone has a high degree of inaccuracy. This is especially true for the Bantu, in whom many benign and treatable conditions may mimic malignancy. The ideal is that no case should be accepted for registration without pathological proof or at least radiological and biochemical evidence.

The Present Survey: comprises data of 207 males and 239 females. The findings are summarized in the author's paper "Malignant Neoplastic Disease in the South African Bantu" abstracted below.

The Percentage of Neoplasms in each Age Group: Charts show these plotted against the standardized population of the region. The result is a sharply rising curve, similar to that in Europeans, with its maximum at 56+. The maximum incidence of carcinoma of the cervix uteri is found to occur at a decade later than in the population of Denmark, showing what a misleading picture a curve plotted directly from the number of cases in the hospital may present.

It is generally believed that the ratio of mesenchymal to epithelial tumours is unduly high in the Bantu. In Denmark the ratio of carcinoma to sarcoma under 50 years is 4 to 1, after 50 years is 23 to 1. In the Bantu series the ratio as a whole is 5 to 1, but after 56 years it is 10 to 1. The figures are unduly influenced by the low proportion of people in the older age groups.

The Problem in the Future: (a) The collection and study of all tumours observed in the non-European hospitals to ascertain their regional distribution, for which we must know the hospital population and that of the supplying townships in regard to sex and age composition and expectation of life for comparison with similar European figures; (b) to establish an approximate morbidity rate for the Bantu in selected areas.

W. L. Harnett

Higginson, J. **Malignant Neoplastic Disease in the South African Bantu.** Reprinted from *Cancer*. 1951, Nov., v. 4, No. 6, 1224–31. [25 refs.]

In South Africa over the last 50 years an urban Bantu population has grown up, resulting in disruption of tribal life, alterations in diet and acquisition of social habits approximating to those of the European. Published statistics of cancer in the Bantu are unreliable, because the hospital populations utilized were not comparable or the age distributions were not given. The statement that a disease occurs so often among so many patients admitted means little unless these admissions are analysed for age, sex and regional distribution. In necropsy statistics those for the incurable visceral tumours are more reliable than those for the curable groups—breast, skin or uterus, but in South Africa patients with incurable tumours are sent home to die once the diagnosis has been made, causing so much selection in the necropsy statistics as to render them useless for comparison with other series.

In this paper the author gives a summary of cancer cases seen among the patients in Baragwanath Non-European Hospital in Johannesburg. From a 10 per cent. random sample of admissions over a period of 2½ years, from July 1948 to December 1950, it appeared that 36 per cent. of the male and 11·5 per cent. of the female admissions were for injury, and all but 2·1 per cent. were Bantu. Only 14 per cent. of the patients admitted were more than 45 years of age. A random sample of the population of the Bantu quarter of the city showed that only 10 per cent. were more than 50 years of age, against 27 per cent. of the population of England and Wales in 1947. The regional distribution and pathological types of an unselected series of 500 tumours examined microscopically during this period are set out in a table. Another table shows the percentages of carcinoma and sarcoma respectively in each age-group and the distribution by site, the tumours of the female genito-urinary system being much the largest group. Squamous-cell carcinoma was commoner than basal-cell carcinoma.

the reverse of the usual finding in Europe and in white persons in the U.S.A.

Tumours of the salivary glands formed 18 per cent. of the gastrointestinal tumours in the male and 24 per cent. in the female; in the male the numbers of mixed tumours and of adeno-carcinomata were about equal; in the female mixed tumours preponderated. There was a high incidence of oesophageal carcinoma compared with gastric carcinoma (21 to 11); the latter formed 9·5 per cent. of the gastrointestinal tumours, in contrast to Europe and the U.S.A. where deaths from gastric cancer vary from 25 to 66 per cent. of total cancers [22 per cent. for males and 16·5 per cent. for females in the Registrar-General's statistics for 1938–39]. Primary carcinoma of the liver always forms a high proportion of all series of malignant tumours collected from the Bantu in S. Africa, on an average about 32 per cent. of tumours in males in the Non-European General Hospital, Johannesburg, with higher percentages for the East Coast tribes; the present series shows only 5 per cent. [Kennaway has shown (see this *Bulletin*, 1945, v. 42, 150) that primary liver carcinoma results from environmental factors and is not due to racial differences.] Carcinoma of the cervix uteri formed 24 per cent. of the total neoplasms and 54 per cent. of carcinomata in the female [11·9 per cent. in London in 1938–39], which is doubtless related to early marriage and child-bearing. The maximum incidence is in the decade 36–45, but after standardization against the hospital population, is found to be in the 6th decade. There were only 3 cases of carcinoma of the body of the uterus to 124 of the cervix [in London in 1938–39 the proportion was 1 to 4]. Carcinoma of the lung formed 11 per cent. of the total carcinomata in males and carcinoma of the breast 8 per cent. of the total female carcinomata [in London in 1938–39 the proportion was 29·7 per cent.].

[For a discussion of the possible fallacies in this kind of survey, see the author's paper (abstracted above) on "A Rational Approach to Cancer Surveys in the Bantu".] *W. L. Harnett*

PARASITOLOGY: GENERAL

Shrivastav, J. B. **A Survey of the Intestinal Parasites in the Human Population in Bombay, with special reference to** *Endamoeba histolytica*. *Indian J. Med. Res.* 1953, Oct., v. 41, No. 4, 397–414, 4 graphs. [50 refs.]

The author gives the following summary:—

"1. This paper deals with the survey of three selected groups of the population in Bombay with regard to their intestinal parasitic flora.

"2. Group A deals with apparently healthy individuals without abdominal symptoms and in this group 384 cases were examined. The incidence of important pathogens in this group was: *E. histolytica* 20·1 per cent, *Giardia lamblia* 11·5 per cent, hookworm 12·2 per cent, tapeworm 2·9 per cent, *Ascaris lumbricoides* 22·4 per cent.

"3. In group B people with vague abdominal symptoms were examined and in 1,010 cases the incidence of these parasites was as follows: *E. histolytica* 35·6 per cent, *Giardia lamblia* 21·5 per cent, hookworm 16·6 per cent, tapeworm 3·4 per cent, *Ascaris lumbricoides* 20·2 per cent.

"4. The two infections of significance in group B were *E. histolytica* and *Giardia lamblia*. The details of signs and symptoms in these two infections singly and when occurring together are given and their peculiarities pointed out.

" 5. In group C 104 cases of acute dysentery were investigated and the relative frequency of the different pathogens was: Amoebic 44·2 per cent, mixed 4·8 per cent, bacillary 37·5 per cent, of *Giardia lamblia* origin 7·7 per cent and of helminthic origin 5·8 per cent.

" 6. The relevant literature is briefly reviewed and compared with the findings in this survey."

[The data are all based on only a single stool examination by direct microscopy and by a zinc-sulphate flotation technique.] *A. R. D. Adams*

Causa, A., Milanés, F. & León, P. M. Alteraciones histo-patológicas del hígado en algunas parasitosis. Estudio clínico-patológico. [**Histological Changes in the Liver in Parasitosis**] *Rev. Cubana Lab. Clin.* 1954, Jan.–Feb.–Mar., v. 8, No. 1, 22–9, 9 figs. [22 refs.]

The changes described and illustrated in this article are well known to workers in tropical pathology. The author describes them under 4 heads.

1. Those associated with malaria, from biopsy specimens taken (a) in an early stage when the cells most affected are dark, with reticulo-endothelial response, lymphocytic infiltration and deposits of dark pigment; (b) a fortnight later, when there is hypertrophy of the Kiernan spaces and collagen reaction, more reticulo-endothelial reaction and inflammatory infiltration and pigment in the Kupffer cells; (c) 6 weeks later, when the inflammatory infiltration has passed off together with the reticulo-endothelial reaction and the pigment formation. Another specimen shows dilatation of the sinusoids, reticulo-endothelial hypertrophy and hyperplasia and black pigment.

2. Section of liver showing a larval form of *Taenia solium* seen at autopsy of a patient dying of carcinoma of the stomach.

3. The histology of amoebic hepatitis and amoebic abscess.

4. The histology of infection by *Fasciola hepatica*, in material obtained by biopsy and also where it was found at a necropsy, interesting in the fact that this trematode is rarely met with in the parenchyma of the human liver. *H. Harold Scott*

Galliard, H. Hormones hypophysaires (ACTH et somatotrophine) et cortico-surrénale (cortisone) dans les infections à protistes sanguicoles humaines et expérimentales. [**Pituitary and Suprarenal Hormones in Human and Experimental Protozoal Infections of the Blood**] *Bull. Acad. Nat. Méd.* 1953, v. 137, Nos. 30–31, 507–10.

This paper presents a useful summary of the effect of pituitary (adrenocorticotrophic and growth) and suprarenal (cortisone) hormones on protozoal infections; it also includes some recent observations of the author. He showed that the administration of cortisone (2 mgm. daily) to mice infected with *Plasmodium berghei* caused death to take place earlier (in 6 instead of 9 days), though it had no effect on rats. Pigeons infected with *P. relictum* and given 5 mgm. of cortisone daily showed a higher parasitaemia than controls on no hormone, and many of the birds died. The administration of cortisone or corticotrophin to animals infected with virulent strains of *Toxoplasma*, *Trypanosoma brucei* and *T. cruzi* provoked more acute infections and earlier death; but with the milder *T. gambiense* and another strain of *T. cruzi*, the hormones produced no effect. These results were accompanied by positive or negative Thorn reactions: if the infection was less virulent, eosinopenia followed, if severe (as in *P. berghei* malaria of

mice) the eosinophiles remained undiminished, denoting gross dysfunction of the adrenal cortex. The growth hormone of the pituitary gland (STH) had an opposite effect to cortisone: 5 units given to mice for 2 days before infection with *P. berghei* and continued daily were sufficient to delay the incubation period from the usual 2 days to 8, to cause a low parasitaemia and prolong the life of the animal. Also in frogs infected with *Trypanosoma inopinatum* and treated with STH, the usually rapidly fatal infection was replaced by a latent infection of long duration. *P. C. C. Garnham*

Blacklock, D. B. & Southwell, T. **A Guide to Human Parasitology for Medical Practitioners.**

This book was reviewed on p. 443.

ENTOMOLOGY AND INSECTICIDES: GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Laird, M. **Insects collected from Aircraft arriving in New Zealand from Abroad.** *Zool. Publ. Victoria Univ. College.* Wellington, N.Z. 1951, Sept. 3, No. 11, 30 pp. [53 refs.] [Issued also as *Roy. New Zealand Air Force Entom. Bull. No. 6.*]

The author reports on the examination for insects of 246 aircraft, including various military and civilian types, on their arrival in New Zealand. He examined 20 of these aircraft personally; they all contained insects, totalling 262 specimens. The remaining 226 aeroplanes were searched by RNZAF orderlies and 68 of them were positive, producing only 295 specimens. The discrepancy was partly due to the fact that the insects were collected after disinsectization of the aircraft and were usually dead; thus, in the first search of any aeroplane numerous old dead specimens were liable to be collected. The aircraft examined by the author were examined only once each, whereas those searched by the orderlies were examined many times at the end of various flights. Some of the difference, however, is likely to be due to the greater experience of the author. These facts show how difficult it is to compare records of aircraft examinations made by different authors. (Indeed, figures varying from 1·5 to 33 insects per aeroplane have been reported.)

The insects taken on aircraft landing in New Zealand belonged to 56 different families, belonging to 10 orders; there were also 9 spiders. The most common were those belonging to the largest orders: Diptera, Lepidoptera, Hymenoptera and Coleoptera and reflected their natural prevalence, combined with suitable activity and habits. House-flies, for example, were the most common specific type.

The species identified are listed in 2 groups: those of medical or economic significance and the others. In respect of the latter, the probable country of origin is given and it is seen that most of them occur in New Zealand, Australia or Fiji.

The insects of medical importance include 7 mosquitoes, all Culicine, only one (*C. fatigans*) being already present in New Zealand. The other species were *Mansonia crassipes*, *Aëdes aegypti*, *Aëdes albolineatus*, *Aëdes*

tongae, *Culex annulirostris* and *C. sitiens*. Some of these can transmit filariasis or dengue and therefore represent a not inconsiderable risk to New Zealand. It seems, however, somewhat unlikely that the mosquitoes which are actually infective would be introduced. The other insects of medical or veterinary importance include cockroaches, human fleas and a variety of blowflies, nearly all of these already present in New Zealand.

The occurrence of two important agricultural pests is discussed. One of these is not established in New Zealand and might present a serious problem. The other is a New Zealand pest which might perhaps be transported elsewhere. This question of *exporting* pest insects is a subject often neglected.

The aircraft disinsectization procedure on arrival in New Zealand involves the usual dissemination of aerosol from a "bomb". In addition to the passenger cabin, the baggage compartment and wheel cavities are treated. The operator also inspects the exterior of the fuselage for insect egg masses, which the author has shown to present some risk of introducing insects by air.

Regular inspection and treatment of possible mosquito breeding sites is also maintained in the vicinity of the airport. [See also Porter and Hughes, this *Bulletin*, 1951, v. 48, 205.] *J. R. Busvine*

Waterhouse, D. F. **The Occurrence and Significance of the Peritrophic Membrane, with special reference to Adult Lepidoptera and Diptera.** *Australian J. Zool.* 1953, Dec., v. 1, No. 3, 299–318, 5 text figs. & 11 figs. on 2 pls. [48 refs.]

The author's summary appended to the paper is as follows:—

"Adults of a number of lepidopterous families and most adult cyclorrhaphous Diptera possess a tubular chitinous peritrophic membrane arising at the level of the oesophageal invagination.

"Membranes containing chitin, and produced by the general midgut epithelium, are present in adults of some other families of Lepidoptera and in some nematocerous and orthorrhaphous Diptera. In some species of these latter groups (e.g. the blood-sucking females of mosquitoes and tabanids) membranes appear to be mainly formed following ingestion of food and are produced by a restricted region of the general midgut epithelium. Chitin-containing membranes enveloping the food are present also in Thysanura, Embioptera, Mallophaga, Coleoptera (Dermestidae and Carabidae), Mecoptera, and Hymenoptera (some Formicidae).

"It has been established that the midgut epithelium is able to secrete a chitinous membrane. It is probable that the ancestral insect midgut epithelium possessed the capacity to secrete chitinous membranes enveloping the food. This capacity has been lost in some insects and in others it has been restricted to a particular zone of the midgut. It is possible that the well-defined tubular membranes are the result of the restriction of this capacity to the extreme anterior end of the midgut."

Jackson, Nancy. **Observations on the Feeding Habits of a Predaceous Mosquito Larva, *Culex (Lutzia) tigripes* Grandpré and Charmoy (Diptera).** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1953, Dec. 31, v. 28, Pts. 10/12, 153–9.

The feeding habits of the predacious larvae of *Culex (Lutzia) tigripes* were studied in the laboratory, larvae of *Aëdes aegypti*, *Culex* sp. and

Anopheles gambiae being offered as food. The numbers eaten depended on the size of the prey and one *Lutzia* larva ate a maximum of 88 *Aëdes aegypti* larvae belonging to the first, second and third stages. However, larvae of *Lutzia* can undergo development without this type of food and a second-stage larva, fed on dried yeast, was reared to the adult stage. In her experiments, the author observed that *Lutzia* larvae preferred the larvae of *Aëdes aegypti* to those of *Culex* sp. or *A. gambiae*.

The spontaneous and induced movements of the 4 species of larvae were studied, as they were considered to be probable factors responsible for this apparent preference. It was found that *Aëdes aegypti* larvae showed the greatest amount of spontaneous movement as well as induced movement after stimulation by tapping the edge of the container with a glass pipette or touching the larvae with a pipette. *Lutzia* showed the least spontaneous movement but showed more induced movement than either *Culex* sp. or *A. gambiae*. These results seem to suggest that the preference shown by *Lutzia* for *Aëdes aegypti* is due to the greater activity of *Aëdes aegypti* larvae which thus come within easy " striking distance " of the comparatively stationary *Lutzia* which makes little effort to seek for prey. The fact that fewer larvae were eaten by a *Lutzia* when put in a large volume of water lends further support to the above suggestion.

In discussing the importance of *Lutzia* in the biological control of mosquitoes, the author points out that the adults of *Lutzia* are blood-suckers and this makes them much less suitable for this purpose than the larvae of *Toxorhynchites* which have been used in mosquito control in the Pacific Islands [this *Bulletin*, 1934, v. 31, 807]. *M. G. R. Varma*

Knight, K. L. & Abdel Malek, A. A. **A Morphological and Biological Study of *Culex pipiens* in the Cairo Area of Egypt (Diptera-Culicidae).** *Bull. Soc. Fouad 1er Entom.* Cairo. 1951, v. 35, 175–85.

Numerous larvae and pupae of *Culex pipiens* were collected in suburban areas of Cairo and bred out to the adult stage in the laboratory. About 100 adults of each sex were then put in a 10″-cube cage, fed on sugar, and provided with an oviposition dish for the first 12 days. At the end of this period some autogenous egg-rafts were laid. Ten females were then withdrawn and their spermathecae examined for spermatozoa. This gave a measure of the degree of stenogamy in the sampled group, that is, the proportion inseminated in the particular size of cage used. A further 30 females were removed and offered a blood meal on man, and 30 other females were tested for their readiness to feed on a pigeon. After 30 minutes the percentage fed in each batch was noted. The fed females of each batch were kept for 25 days and a count was made of all rafts laid; these were examined also as regards various details such as shape, number of eggs and hatching-rate. Similar data were recorded for the autogenous rafts (laid after the initial sugar diet). Morphological features of the adults and larvae of these samples of Cairo *C. pipiens* were also studied.

The paper gives a morphological description of the male and female of *C. pipiens* of Cairo, and of its egg and larva, accompanied by tables of statistical details of ratios and other measures made on 34–118 adults and 23–200 larvae, the number of specimens examined varying with the type of character.

The biological studies showed that a small percentage of the adults were autogenous, laying eggs on the sugar diet (a " *molestus* " feature), this character being apparently recessive since it appeared in progeny from

anautogenous rafts (laid after a blood meal). Fertilization took place in all samples, from which it was concluded that the mosquitoes were stenogamous. Both man and pigeon proved acceptable as hosts; there was great variation in the different samples as to the percentage feeding on these hosts (man, mean = 30 per cent. fed, with a range of 13·3 to 70 per cent.; pigeon, mean = 19·6 per cent. fed, with a range of 3·3 to 66·7 per cent.). Owing to climatic fluctuations during the year of experimentation the only important conclusion is that *C. pipiens* of Cairo does feed on man as well as pigeon. The larval habitats from which the samples were gathered varied from clean ground pools to polluted cesspools. Rafts were found throughout the year. It is proposed that since it exhibits certain *molestus*-like biological and morphological characters and is, so far as is known at present, urban in distribution, the *C. pipiens* of Cairo should be designated as *C. pipiens*, form " molestus ". It is probable that *C. pipiens* var. *berbericus* of Algeria is also form " molestus ".

No *C. fatigans* were found in Cairo.

(The term " form " is defined as a single unit of an incompletely analysed species complex.)

[See also this *Bulletin*, 1952, v. 49, 651.] *D. S. Bertram*

Lewis, D. J. *Culex* **Mosquitoes of Subgenera other than** *Culex* **in the Anglo-Egyptian Sudan.** Reprinted from *Ann. & Mag. Nat. Hist.* Ser. 12, 1954, Jan., v. 7, 7–12, 7 figs. [13 refs.]

The 17 species listed in this paper are additional to those already reported as occurring in the Sudan. All known localities are shown on maps, newly recorded places being named.

None of the species mentioned is known to bite man in the Sudan. Two species are of practical interest, firstly, *Culex* (*Lutzia*) *tigripes* whose larvae probably destroy many larvae of *Anopheles gambiae*, and secondly, *Culex* (*Culiciomyia*) *nebulosus* which in the larval stage can be mistaken for *Aëdes aegypti* by public health workers. *H. S. Leeson*

Haufe, W. O. **Predicting Mosquito Emergence.** Reprinted from *Proc. New Jersey Mosquito Extermination Ass.* 1953, 52–7, 3 figs.

This work has been carried out in Manitoba to assist in estimating the time of peak emergence of *Aëdes* mosquitoes, so that spray programmes from aircraft can be put into operation with the maximum effect.

Curves showing the effect of water temperature on the time taken for emergence by male and female *Aëdes communis* are given. *Aëdes communis* is a typical forest species and the results are compared with those given by a tundra species, *Aëdes nearcticus*, and a large species, *Aëdes excrucians*. The tundra species shows a lower threshold of development than that shown by species associated with forest cover and it appears that the larger forest species has a higher threshold of development than the smaller one.

Attempts are being made to investigate the relationship between thermal conditions in the pools and meteorological conditions. This may eventually assist in predicting mosquito emergence in remote areas. It is suggested that in areas where meteorological factors are recorded, daily thermal effects of these factors might be additively recorded day by day from the first spring thaw. *Anne Hudson*

Mitchener, A. V. **Control of Mosquito Larvae and Pupae with some Chlorinated Hydrocarbons.** *J. Econom. Entom.* 1953, Dec., v. 46, No. 6, 1118–19.

"Aldrin, DDT, dieldrin, endrin, isodrin and toxaphene are all satisfactory larvicides on *Aedes dorsalis* (Mg.) and *Aedes vexans* (Mg.) at one part per million parts of water. At one part to two million and five million parts of water respectively good control was obtained with aldrin, DDT, dieldrin, endrin and isodrin while toxaphene was less toxic. Even at one part to ten million parts of water aldrin, DDT, dieldrin and endrin gave good control.

"Endrin gave excellent control of pupae at one part to two million parts of water. Dieldrin and isodrin came next in that order. There was little difference among these three insecticides at one part to five million parts of water."

LeRoux, E. J. & Morrison, F. O. **Dosage of DDT needed to kill a House Fly.** *J. Econom. Entom.* 1953, Dec., v. 46, No. 6, 1109–10.

"Mortality of house fly adults treated with 2 micrograms of DDT was reduced by amputation of the treated leg after 30 minutes, but not after 4 hours. Amputation of treated labella after 30 minutes had no effect. Ninety-one per cent of the radio activity in an applied dosage of carbon 14 labelled DDT was recovered from treated legs and 90 per cent to 93 per cent from treated labella after 30 minutes, 80 per cent from treated legs after 4 hours. Absorption and distribution of 10 to 20 per cent of the applied dosage produced the full effect. The locus of application did not influence rate of absorption but did influence effectiveness."

Lewis, D. J. **Early Travellers' Accounts of Surret Flies (Tabanidae) in the Anglo-Egyptian Sudan.** Reprinted from *Sudan Notes & Records.* 1952, v. 33, Pt. 2, 276–98, 2 maps on 2 pls. [Numerous refs.]

In this paper the author fills in the details promised in his paper on the Tabanidae of the Sudan reviewed in an earlier number of this *Bulletin* [1953, v. 50, 769], and gives numerous extracts from the accounts of early travellers taken from general works published between 1790 and 1900. Even if these extracts do, as he frankly admits, contain "many errors, exaggerations and misconceptions" they still provide information of real value, especially as summarized by him "in the light of modern knowledge" and his own extensive experience of these insects. This paper certainly makes available to the general reader much information not easily accessible, and its preparation must have entailed much patient research and reading on the part of the author. *W. H. Potts*

Tashiro, H. & Schwardt, H. H. **Biological Studies of Horse Flies in New York.** *J. Econom. Entom.* 1953, Oct., v. 46, No. 5, 813–22, 4 figs.

In a study over 2 seasons near Ithaca, New York, adults of 23 species of *Tabanus*, 18 of *Chrysops*, 3 of *Atylotus*, and one of *Goniops* were taken. *T. quinquevittatus* and *T. lasiophthalmus* formed 58 per cent. of the collections. *T. sulcifrons*, *T. pumilus*, and *T. lineola* were less numerous and the other species combined amounted to about a quarter of all tabanids collected. The work was undertaken with a view to devising methods of protecting dairy herds against horseflies but this practical problem is far

from being solved. The 2 seasons—1948 and 1949—differed in weather conditions, the second year being warmer in the late spring and early summer than was the case in 1948. Differences in numbers of each species during the season of late May to September are clearly shown in graphs recording for 1948 and 1949 the relative abundance of the 5 commoner species. Tabanids were attracted particularly to large, dark animals and also to the more unfit individuals. Weighings of freshly engorged flies of 3 of the common *Tabanus* indicate that a loss of at least 300 cc. of blood per animal per day is not an unreasonable estimate.

Troublesome non-biting flies swarming round tabanid bites to suck up blood were *Hydrotaea tuberculata* and *Hippelates pallipes*.

Observations on breeding places were made by searching for larvae in soil samples of 1 yd. square by 3 or 4 in. deep. The largest number in one sample was 27 larvae of *T. quinquevittatus*. In general, few larvae were deeper in the soil than 4 in. Sampling in a gradient from standing water to dry gravel-loam, 22 per cent. of *Tabanus* larvae were in swamp, 73 per cent. in the adjacent drier zone supporting *Carex* (this was a useful index plant for locating optimum soil-moisture conditions for tabanid larvae), and only 5 per cent. in the still drier loam. *Chrysops* and *Atylotus* larvae were also taken from this transect. *D. S. Bertram*

Saccà, G. & Rivosecchi. L. Contributo alla conoscenza faunistica del genere *Sarcophaga* in Italia (Diptera, Calliphoridae). [**A Contribution to the Study of Insect Lore on the *Sarcophaga* Species in Italy (Diptera, Calliphoridae)**] *Rendiconti Istituto Superiore di Sanità*. Rome. 1954, v. 17, Pt. 3, 174–87. [16 refs.] English summary (5 lines).

Lewis, D. J. **Simuliidae in the Anglo-Egyptian Sudan.** Reprinted from *Rev. Zool. Bot. Africaines*. 1953, v. 48, Nos. 3/4, 269–86, 17 figs. [16 refs.]

It is known that 22 species and 2 varieties of *Simulium* occur in the Anglo-Egyptian Sudan. Three species molest man, *S. damnosum* the vector of human onchocerciasis, *S. griseicolle* and *S. dentulosum*. The last named has only been seen to settle without biting. The other species probably do not bite man and there is evidence that *S. bovis*, *S. elgonense* and *S. lepidum* do not do so.

This paper records the known distribution of the species; maps show the localities mentioned in the text and the principal rivers and selected contours and isohyets.

Water speed is important in determining breeding places but in the absence of numerous measurements of water speed it is convenient to classify the breeding habits of the species according to the approximate size of the breeding places. Species from rivers (which are often faster than streams) tend to have an apparently stronger and more flexible type of larval mouth brush ray, stouter pupal respiratory filaments and more protective cocoons.

S. damnosum breeds mainly and *S. griseicolle* entirely in rivers. In the south the small streams do not produce enough *S. damnosum* to maintain onchocerciasis. Between the streams and the swamps, onchocerciasis is a difficult problem but the country is relatively unproductive. In the north *S. griseicolle* flourishes in a populous reach of the Nile. It attains vast numbers (north of Khartoum) near the northern limit of its range.

H. S. Leeson

Babers, F. H. & Roan, C. C. **The Dehydrochlorination of DDT by Resistant Cockroaches.** *J. Econom. Entom.* 1953, Dec., v. 46, No. 6, 1105.

Goodchild, A. J. P. **Culture of Insect Tissues.** [Correspondence.] *Nature.* 1954, Mar. 13, v. 173, 504–5.

Insect physiologists have not succeeded in producing cultures of insect tissues in the sense of being able to maintain them by means of sub-cultures over an extended period of time.

In an attempt to do this, the author used fourth and fifth instar nymphs of *Rhodnius prolixus* which had been fed 4 to 7 days previously. With a sterile technique a total of 48 hanging drops of the insects' haemolymph were made in which small snips of abdominal cuticle and epidermis were suspended. The visible changes which occurred were regarded as degenerative.

A few trials were made with other parts of the bugs; with bacteriological broth instead of haemolymph and with tissues of *Blatta orientalis*—all without success.

In future work the author suggests the substitution of mica for glass or else a wax film over the glass surfaces and the enrichment of the culture medium with an extract of *R. prolixus* embryos; he also emphasizes that, up to now, there is no indication that insect tissues will form cultures of the sort familiar with vertebrate material. *H. S. Leeson*

Heisch, R. B. **First Record of *Argas reflexus* (Fabricius) Latreille, 1796 from East Africa.** *East African Med. J.* 1954, Mar., v. 31, No. 3, 89–91, 3 figs.

Nat. Acad. Sci.: Nat. Res. Council. Publication 219. **Conference on Insecticide Resistance and Insect Physiology.** December 8–9, 1951, University of Cincinnati. pp. ii + 99, 11 figs. [18 refs.] 1952. Washington. [12s.]

Some of the papers presented at this Conference are reported *in extenso* while others appear as brief abstracts; but all the discussions are given *verbatim*. The more or less successful efforts of the stenographers are reflected in frequent use of the vernacular ("I wouldn't put anything past the flies any more"), in a few serious errors of fact (3 on the first page) and by several recorded statements apparently devoid of meaning. Nevertheless, this publication is useful in recording to those who did not attend the Conference the aspects of insect resistance being studied in various American laboratories. In view of some published inconsistencies it is valuable to read of immediate confirmation or disagreement about some of the facts presented by other workers. Furthermore, much of the discussion was too speculative to find its way into a reputable scientific journal; but in this context it was stimulating and interesting.

It is not feasible to abstract all the various contributions, some of which are given briefly without detailed evidence, and others have been published in full elsewhere. Probably the most useful data presented are a number of isolated observations which might otherwise escape publication. The following points have struck the reviewer as worthy of note.

Drs. Chadwick, Decker and March, in their various laboratories, have been selecting house-flies for resistance to insecticides of the phosphoric acid type and also to pyrethrins. They all found that at first resistance increased moderately (to about × 10 or × 20) but that no further advance was obtained after selection for over 50 generations. Dr. Chadwick also obtained a strain resistant to high temperature.

There were several discussions of the dehydrochlorination of DDT to the innocuous DDE, which is believed to be one factor in house-fly resistance

(among others, by Drs. Lindquist and Winteringham, both of whom used radio-active isotopes in this study). Dr. Kearns gave evidence of this type of degradation in 3 naturally insusceptible species: the Mexican bean beetle, a grasshopper (*Melanoplus*) and a caterpillar (*Argyrotaenia velutinana*). The last-mentioned was unable to degrade the DDT-analogue DDD.

Dr. Decker produced some curves showing rates of increased resistance of house-flies due to laboratory selection. He found that resistance developed more rapidly when larvae rather than adults were exposed to DDT. Also, that resistance to a second insecticide sometimes developed spontaneously; and even where further selection was required the new resistance was acquired more rapidly than would be expected with normally susceptible strains. Finally he observed that DDT-resistant flies had rather slower development than normal flies, so that in a mixed population the more susceptible flies emerged first. Professor Hoskins confirmed this last point.

After giving some results which have since been published elsewhere, Dr. March quoted data of a colleague, showing that several species of blowflies had not become resistant while co-inhabiting a sprayed dairy with resistant house-flies.

The last few papers of the symposium were of a speculative and general nature. Dr. Demerec summarized facts on bacterial resistance; Dr. Crow analysed the genetical aspects of insect resistance; and, finally, Dr. Hodson and numerous other speakers related the question of insecticide-resistant strains to population dynamics. *J. R. Busvine*

Roadhouse, L. A. O. **Laboratory Studies on Insect Repellency.** *Canadian J. Zool.* 1953, Oct., v. 31, No. 5, 535–46.

Certain typical molecular groups have been shown to be particularly effective repellents, and substances containing certain of these groups have been synthesized or prepared and used in tests in Ottawa with the mosquito *Aëdes aegypti.* Wire-mesh cages of approximately 9 cubic foot capacity, containing 1,000 *Aëdes aegypti* of both sexes were used, and the experimenter's forearm, covered with 1 gm. of the candidate repellent, was inserted into the cage for a 3-minute period. This was repeated at half-hour intervals. The time to the first, second and third bites was recorded together with the number of mosquitoes landing in each 3-minute period. The untreated forearm was used as a control.

The repellencies of chemicals in various groups were recorded; these groups included monoalcohols, alpha hydroxy acid esters, 1,3-glycols, 1,2-glycols, aldehydes and ketones. The maximum repellent activity was invariably exhibited by compounds with atmospheric boiling points ranging from 230° to 260°C. and this is presumed to be because chemicals in this range maintain a vapour pressure that is repellent to mosquitoes.

Of the monoalcohols tried, the best repellent was shown to be cinnamyl alcohol which has a boiling point of 257°C. A large difference in the repellency of cinnamyl alcohol and its acetate was shown although both have a high repellent action; little difference in repellency was shown by geraniol and its acetate both of which have a low repellent activity.

Of the alpha hydroxy acid esters, ethyl mandelate shows the highest repellency and has a boiling point of 250°C. Piperonal, boiling point 245°C., had the highest repellent activity of the aldehyde and ketone group. Repellency was always found to be enhanced by the use of mixtures. Excluding compounds containing nitrogen, the important atom from the point of view of repellency seemed to oxygen. *Anne Hudson*

Gasser, R. Über ein neues Insektizid mit breitem Wirkungsspektrum. [**On a New Insecticide with a Wide Range of Effectiveness**] Reprinted from *Ztschr. f. Naturforsch.* 1953, v. 8b, No. 5, 225–32. [Refs. in footnotes.]

This paper introduces a new phosphorus insecticide Diazinon produced by the Swiss Geigy Company. It is the [2-isopropyl-4-methyl-pyrimidyl (6)] diethyl ester of thiophosphoric acid. In a pure state it is a colourless liquid (BP 83–4°C. at 0·002 mm.Hgm.; D^{20} 1·117; vapour pressure at 20°C., 0·00014 mm.Hgm.). Its mode of action against insects appears to be similar to that of other phosphoric acid insecticides, since the signs of poisoning (*e.g.* in house-flies) are similar to those of parathion. Enzymatic studies show that it is a highly active inhibitor of cholinesterase and even more of pseudocholinesterase. Nevertheless, its toxicity to vertebrates is not very high, the acute median lethal doses (cmm./kgm.) being: 96 for mice, 235 for rats, 320 for guineapigs and 130 for rabbits.

Examples are given of agricultural and other pests against which it is effective both as a contact or stomach poison. It penetrates plant foliage but does not have systematic action.

In the medical and veterinary field it is promising against mosquitoes, bugs and lice; but its most promising use is against house-flies resistant to chlorinated hydrocarbon insecticides. In one Swiss village infested with resistant flies it was found that good control could be obtained for 4 to 6 weeks by spraying with 0·1 per cent. aqueous emulsion of Diazinon.

J. R. Busvine

Gersdorff, W. A., Mitlin, N. & Nelson, R. H. **New House Fly Insecticides.** *Soap.* New York. 1954, Feb., v. 30, No. 2, 133, 159.

"The relative toxicity to house flies of Diazinon [O,O-diethyl O-(2-isopropyl-4-methyl-6-pyrimidinyl) thiophosphate], Bayer 21/199 [O,O-diethyl O-(3-chloro-4-methylumbelliferone) thiophosphate], and Bayer L 13/59 (a dialkyl phosphonate) were determined by the Campbell turntable method. They were, respectively, 0·51, 0·34, and 0·073 as toxic as parathion and 31, 21, and four times as toxic as pyrethrins.

"At the concentrations tested they caused no more than negligible knockdown of flies in 25 minutes."

Knipe, F. W. **Some Recent Design Improvements in Compression Sprayers.** *Soap.* New York. 1953, Aug., v. 29, No. 8, 143–7, 151, 2 figs.

REPORTS AND SURVEYS

Floch, H. Rapport sur le fonctionnement technique de l'Institut Pasteur de la Guyane Française et du Territoire de l'Inini pendant l'année 1952. [**Annual Report of the Pasteur Institute of French Guiana and Inini for 1952**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 288.* 1953, 255 pp. [Refs. in footnotes.]

This Report follows the usual detailed and informative lines of its predecessors [this *Bulletin*, 1953, v. 50, 582].

In the introductory chapter, Colonel Floch refers to the International Congress on Comparative Pathology held in Madrid in May 1952, which

he attended and to which he contributed a report on the application of contact insecticides in the tropics, based on the now well-known campaigns against malaria and yellow fever in French Guiana. During his stay he took the opportunity of studying the leprosy situation in Spain and visited several leprosaria, and he discusses this at some length. He also reports a similar study in Surinam, which he visited during his journey.

The report proper contains the customary account of the routine and research work carried out at his Institute and these subjects occupy over half of the 255 pages. It is noted that 53,461 routine examinations were done and of these, 23,998 were medical and 27,290 were entomological.

The subjects discussed cannot adequately be abstracted but readers will be familiar with them, as most have been published either in the publications of the Institute or in the general literature. There are over 50 pages devoted to leprosy research and 8 to malaria. The dysenteries are discussed fully, as is "*pian bois*". An interesting section is devoted to a survey of the food eaten locally, with its nutritional values shown in tables. There is also an informative account of trials of the food value of edible yeast in children, which seem to be promising.

This report may be read with profit by all who require full information regarding the very considerable activities of the Institute.

H. J. O'D. Burke-Gaffney

BOOK REVIEWS

Smith, E. C. [B.A., M.D., D.P.H., Sc.D., M.R.C.P., M.R.C.P.I., D.T.M. & H.]. **An Introduction to Pathology and Bacteriology for Medical Students in the Tropics.** Revised by R. Kirk, O.B.E., B.Sc., M.D., D.P.H., F.R.F.P.S., M.R.C.P., F.R.S. (Edin.). 2nd Edition. pp. xv + 390, 78 figs. & 18 coloured pls. 1953. London: Staples Press Ltd., Mandeville Place, W.1. New York: Staples Press Inc., 70 East 45th Street. [50s.]

The many medical students in the tropics who have had reason to be grateful for the late Dr. E. C. Smith's textbook [this *Bulletin*, 1940, v. 37, 77] will welcome the appearance of this revised edition prepared by Professor Kirk of the University College of Khartoum. The considerable advance in knowledge during the intervening 14 years has clearly called for considerable revision and Dr. Kirk, whose own practical laboratory experience in Africa is extensive, has carried out this work most admirably while sacrificing little of Dr. Smith's original purposes and plan. In his preface, indeed, Dr. Kirk stresses the fact that the relationship between pathology and clinical medicine has been maintained: the young graduate in the tropics is likely to meet a greater variety of diseases than does his counterpart in temperate climates and to encounter in everyday practice infections such as fungus and parasitic diseases which are seen only rarely outside the tropics.

While bringing the material into line with new knowledge, Dr. Kirk has preserved the general scheme of the book. Most chapters contain new material—many of them a great deal—and much dead wood has been eliminated. Re-grouping of subjects has been made, with advantage, and some chapter headings have therefore been altered, but the number of chapters remains the same. It is noted, for example, that chapter II of the

revised edition, " Disturbances of Metabolism and Circulation ", embodies much of the subject matter of the old chapters V and XVIII, " General Pathological Processes " and " Morbid Conditions due to Mechanical Obstruction ". Similarly the new chapter VI, " Introduction to Bacteria ", replaces the two previous chapters I and II entitled " Micro-organisms ": the staining methods and culture media formerly described in this section are now more appropriately given in an extra appendix, but agglutination is included in this chapter instead of, as previously, in " Inflammation ". There is a useful new chapter entitled " Infection and Resistance " and another called " Some Other Pathological Conditions ", which includes such subjects as traumatic shock, the crush syndrome, intracranial haemorrhage, demyelinating diseases, pneumoconiosis, calculus, and vitamin deficiencies.

Throughout the book, there is evidence of careful selection and addition of new material. The chapters on pathogenic fungi and on viruses and rickettsiae have been brought up to date and are twice as long as their predecessors: new knowledge on diseases of the blood and blood-forming organs is included and both Hodgkin's disease and the leukaemias have been transferred from this section to the chapter on tumours. Nephritis, which formerly occupied a separate chapter, is now included in a chapter on " Scarlet Fever, Rheumatism, Endocarditis and Nephritis ". The index is 3 pages longer and a fourth appendix gives a full list of books suggested for further reading and reference.

All these chapters have increased the length of the book by 110 pages: but it is still of a convenient size, well printed and bound and still, happily, retains Dr. Smith's beautiful illustrations.

The reviewer knows of no book in English on this subject that approaches this one in specifically catering so effectively for medical students in the tropics. One feels that Dr. Smith could not have wished for a more able revision than the present one: indeed it has all the appearance of being not only a task conscientiously accomplished, but a labour of love.

H. J. O'D. Burke-Gaffney

Sluiter, C.Ph. **De dierlijke parasieten van den mens.** [The Animal Parasites of Man] 6th Edition. Edited by N. H. Swellengrebel & J. E. W. Ihle. pp. viii + 487, 3 coloured pls. & 337 figs. 1953. Amsterdam: Scheltema & Holkema N. V., Rokin 74–76. [Fl. 25.]

The sixth edition of the well-known Dutch textbook of medical parasitology—produced again by Professors Swellengrebel and Ihle—incorporates the same subject matter, arranged in the same order, as in the previous edition [reviewed in this *Bulletin*, 1950, v. 47, 675]. Although the new book has been brought up to date by inclusion of all the important recent data, only 7 extra pages of the text and 19 new figures have been added. The reproduction of the coloured plates of malaria parasites has been improved, and the bibliography (occupying 35 pages) is now given separately at the end of the book, instead of in footnotes as previously.

C. A. Hoare

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